

PROCEEDINGS

One Hundred First Annual Meeting

of the

AMERICAN WOOD-PRESERVERS' ASSOCIATION

Royal Sonesta Hotel
New Orleans, Louisiana
May 15-17, 2005

VOLUME 101

**AMERICAN WOOD-PRESERVERS' ASSOCIATION
P.O. BOX 361784 BIRMINGHAM, ALABAMA 35236-1784 USA**

40-Year Assays of Penta-Treated Posts in DeQueen, Arkansas

Craig R. McIntyre
McIntyre Associates, Inc.

H. Michael Barnes
Mississippi State University

Mike H. Freeman
Independent Wood Scientist

DISCUSSION

In February 2000, an AWPA task group inspected posts that had been installed in the DeQueen, AR plot some 40 years earlier. The posts had all been treated with pentachlorophenol-in-oil systems but seven different oils were used. The oils ranged from aromatic distillation fractions to paraffinic fractions as described in Table 1 and naturally they varied in properties. As well, two different conditioning schemes were evaluated in that the posts were either air-dried before treatment or treated as green after steaming. Thus there were a total of 14 variables and 10 replicates were installed for each variable.

RATING

As in previous inspections¹, each post was pulled from the ground, scraped clean and rated for decay and termite attack using the grading system in AWPA E7. Comments on the condition of the posts were also recorded. These ratings have been summarized and distributed separately but Table 1 reiterates the decay ratings along with previous values. There is little termite attack at this site and essentially all of the 40-year termite ratings are 10's.

The posts that were treated with the green/steamed condition are rated better than the air dry posts across the board. The rating difference is the largest for the two oils with the highest paraffin content (Oils D and E). However all of the ratings show substantial performance considering the 40 years of exposure.

ASSAY

In previous inspections, borings were taken from each post for later analysis. However no cooperator was willing to undertake analysis of all posts so it was decided to sacrifice one post from each group for assay. By random choice, posts numbered with a "6" were selected (i.e. 6 or 16) and a 3 foot section was cut with the groundline in the approximate center of the section. The groundline was marked and the sections were sent to Mississippi State University.

At MSU, each of the sections had 1 in. thick slabs cut at 6 in. aboveground (AG) and at 6 in. belowground (BF). A strip (~1 inch) was cut across the center of each slab and then the strips were cut into ½ inch zones for assay by XRF. Thus, a cube that was ½ x 1 x 1 in. was ground to provide the assay sample. The results are in Table 2.

Discussions with the XRF manufacturer indicated that the lower detection limit for their instrument was 0.06 pcf pentachlorophenol. Therefore, it was decided to simply replace any assay value at or below the detection limit with 0.05 pcf in Table 2. It is recognized that other analytical techniques could have been used for the low samples, but in the end, it was decided that the result was simply not worth the effort. In short, a few samples are very low retention and below the XRF detection limit and these are boldfaced in Table 2.

Further work is planned comparing the current assay data with the previous data. This will be published separately.

¹ See AWPA Proceedings for appropriate years per Table 1

AMERICAN WOOD-PRESERVERS' ASSOCIATION

TASK FORCE

Members of the task force at the inspection were Jim Buchacker, David Bullock, Kerry Edmiaston, Jim Forshaw, Mike Freeman, Bobby Godfrey, Tom Henderson, Craig McIntyre and Joe Pate. The assistance of Rina Allen and the Weyerhaeuser Co. for maintaining the DeQueen site is gratefully acknowledged.

Bob Arsenault was instrumental in setting up the test plot and assisted in all of the previous inspections. His valuable contributions are deeply acknowledged.

Table 1. DeQueen Post Average Decay Ratings

<u>Oil</u>	<u>Condition</u>	<u>1960</u>	<u>1968</u>	<u>1970</u>	<u>1975</u>	<u>1983</u>	<u>1991</u>	<u>1993</u>	<u>2000</u>
A	AIR DRY	100	100	100	99	90	90	90	90
A	GREEN	100	100	100	100	100	100	100	99
B	AIR DRY	100	100	100	100	100	98	98	94
B	GREEN	100	100	99	99	100	100	100	99
C	AIR DRY	100	100	100	94	94	96	96	92
C	GREEN	100	100	100	100	100	100	100	97
D	AIR DRY	100	99	96	88	58	58	58	63
D	GREEN	100	100	97	96	88	88	88	82
E	AIR DRY	100	100	100	98	78	78	78	73
E	GREEN	100	100	100	100	98	98	98	95
F	AIR DRY	100	100	98	94	80	80	80	76
F	GREEN	100	99	99	99	95	95	95	90
G	AIR DRY	100	100	99	99	93	93	93	84
G	GREEN	100	100	100	100	100	100	100	96

A = Aromatic Light Fraction

B = 90% Aromatic Light Fraction + 10% Aromatic Heavy Fraction

C = 75% Aromatic Light Fraction + 25% Aromatic Heavy Fraction

D = 20% Aromatic Light Fraction + 80% Paraffinic Light Fraction

E = 40% Paraffinic Heavy Fraction + 60% Paraffinic Light Fraction

F = Paraffinic Light Fraction

G = Waxy Petroleum Fraction with High Pour Point

AMERICAN WOOD-PRESERVERS' ASSOCIATION

Table 2. DeQueen Assays 2000

Sample No.	Condition	Location AG or BG	Zone No.	Zone (Inches)	PCP (pcf)	PCP (%)
A-6-A	Air Dry	AG	Z-1	0.0-0.5	0.18	0.55
A-6-A	Air Dry	AG	Z-2	0.5-1.0	0.14	0.44
A-6-A	Air Dry	AG	Z-3	1.0-1.5	0.13	0.41
A-6-A	Air Dry	AG	Z-4	1.5-2.0	0.11	0.34
A-6-A	Air Dry	AG	Z-5	2.0-2.5	0.10	0.31
A-6-B	Air Dry	BG	Z-1	0.0-0.5	0.30	0.92
A-6-B	Air Dry	BG	Z-2	0.5-1.0	0.15	0.46
A-6-B	Air Dry	BG	Z-3	1.0-1.5	0.10	0.32
A-6-B	Air Dry	BG	Z-4	1.5-2.0	0.10	0.32
A-6-B	Air Dry	BG	Z-5	2.0-2.5	0.10	0.32
A-16-A	Steam	AG	Z-1	0.0-0.5	0.33	1.02
A-16-A	Steam	AG	Z-2	0.5-1.0	0.28	0.89
A-16-A	Steam	AG	Z-3	1.0-1.5	0.19	0.58
A-16-A	Steam	AG	Z-4	1.5-2.0	0.25	0.77
A-16-A	Steam	AG	Z-5	2.0-2.5	0.25	0.79
A-16-B	Steam	BG	Z-1	0.0-0.5	0.28	0.89
A-16-B	Steam	BG	Z-2	0.5-1.0	0.16	0.51
A-16-B	Steam	BG	Z-3	1.0-1.5	0.13	0.40
A-16-B	Steam	BG	Z-4	1.5-2.0	0.13	0.41
A-16-B	Steam	BG	Z-5	2.0-2.5	0.21	0.64
B-6-A	Air Dry	AG	Z-1	0.0-0.5	0.15	0.48
B-6-A	Air Dry	AG	Z-2	0.5-1.0	0.13	0.39
B-6-A	Air Dry	AG	Z-3	1.0-1.5	0.10	0.32
B-6-A	Air Dry	AG	Z-4	1.5-2.0	0.10	0.31
B-6-A	Air Dry	AG	Z-5	2.0-2.5	0.16	0.51
B-6-B	Air Dry	BG	Z-1	0.0-0.5	0.16	0.50
B-6-B	Air Dry	BG	Z-2	0.5-1.0	0.09	0.28
B-6-B	Air Dry	BG	Z-3	1.0-1.5	0.10	0.30
B-6-B	Air Dry	BG	Z-4	1.5-2.0	0.14	0.43
B-6-B	Air Dry	BG	Z-5	2.0-2.5	0.17	0.54
B-16-A	Steam	AG	Z-1	0.0-0.5	0.19	0.60
B-16-A	Steam	AG	Z-2	0.5-1.0	0.15	0.46
B-16-A	Steam	AG	Z-3	1.0-1.5	0.14	0.43
B-16-A	Steam	AG	Z-4	1.5-2.0	0.13	0.41
B-16-A	Steam	AG	Z-5	2.0-2.5	0.16	0.49
B-16-B	Steam	BG	Z-1	0.0-0.5	0.27	0.83
B-16-B	Steam	BG	Z-2	0.5-1.0	0.23	0.73
B-16-B	Steam	BG	Z-3	1.0-1.5	0.20	0.63
B-16-B	Steam	BG	Z-4	1.5-2.0	0.39	1.21
B-16-B	Steam	BG	Z-5	2.0-2.5	0.30	0.92

AMERICAN WOOD-PRESERVERS' ASSOCIATION

Table 2 (Cont.) DeQueen Assays 2000

Sample No.	Condition	Location AG or BG	Zone No.	Zone (Inches)	PCP (pcf)	PCP (%)
C-6-A	Air Dry	AG	Z-1	0.0-0.5	0.17	0.54
C-6-A	Air Dry	AG	Z-2	0.5-1.0	0.14	0.43
C-6-A	Air Dry	AG	Z-3	1.0-1.5	0.12	0.37
C-6-A	Air Dry	AG	Z-4	1.5-2.0	0.10	0.32
C-6-A	Air Dry	AG	Z-5	No Sample--Heartwood		
C-6-B	Air Dry	BG	Z-1	0.0-0.5	0.25	0.79
C-6-B	Air Dry	BG	Z-2	0.5-1.0	0.27	0.83
C-6-B	Air Dry	BG	Z-3	1.0-1.5	0.15	0.48
C-6-B	Air Dry	BG	Z-4	1.5-2.0	0.18	0.55
C-6-B	Air Dry	BG	Z-5	2.0-2.5	0.18	0.55
C-16-A	Steam	AG	Z-1	0.0-0.5	0.13	0.41
C-16-A	Steam	AG	Z-2	0.5-1.0	0.11	0.34
C-16-A	Steam	AG	Z-3	1.0-1.5	0.15	0.46
C-16-A	Steam	AG	Z-4	1.5-2.0	0.12	0.38
C-16-A	Steam	AG	Z-5	2.0-2.5	0.15	0.48
C-16-B	Steam	BG	Z-1	0.0-0.5	0.21	0.66
C-16-B	Steam	BG	Z-2	0.5-1.0	0.18	0.55
C-16-B	Steam	BG	Z-3	1.0-1.5	0.26	0.80
C-16-B	Steam	BG	Z-4	1.5-2.0	0.28	0.86
C-16-B	Steam	BG	Z-5	2.0-2.5	0.23	0.72
D-6-A	Air Dry	AG	Z-1	0.0-0.5	0.20	0.63
D-6-A	Air Dry	AG	Z-2	0.5-1.0	0.19	0.61
D-6-A	Air Dry	AG	Z-3	1.0-1.5	0.16	0.49
D-6-A	Air Dry	AG	Z-4	1.5-2.0	0.14	0.44
D-6-A	Air Dry	AG	Z-5	2.0-2.5	0.14	0.45
D-6-B	Air Dry	BG	Z-1	0.0-0.5	0.08	0.26
D-6-B	Air Dry	BG	Z-2	0.5-1.0	0.09	0.28
D-6-B	Air Dry	BG	Z-3	1.0-1.5	0.05	0.16
D-6-B	Air Dry	BG	Z-4	1.5-2.0	0.05	0.16
D-6-B	Air Dry	BG	Z-5	2.0-2.5	0.05	0.16
D-16-A	Steam	AG	Z-1	0.0-0.5	0.12	0.39
D-16-A	Steam	AG	Z-2	0.5-1.0	0.12	0.38
D-16-A	Steam	AG	Z-3	1.0-1.5	0.11	0.34
D-16-A	Steam	AG	Z-4	1.5-2.0	0.10	0.30
D-16-A	Steam	AG	Z-5	2.0-2.5	0.09	0.30
D-16-B	Steam	BG	Z-1	0.0-0.5	0.05	0.16
D-16-B	Steam	BG	Z-2	0.5-1.0	0.05	0.16
D-16-B	Steam	BG	Z-3	1.0-1.5	0.07	0.22
D-16-B	Steam	BG	Z-4	1.5-2.0	0.07	0.21
D-16-B	Steam	BG	Z-5	2.0-2.5	0.07	0.22

Boldface indicates substitution for measured value at or below threshold of 0.06 pcf. See Text.

AMERICAN WOOD-PRESERVERS' ASSOCIATION

Table 2 (Cont.) DeQueen Assays 2000

Sample No.	Condition	Location AG or BG	Zone No.	Zone (Inches)	PCP (pcf)	PCP (%)
E-6-A	Air Dry	AG	Z-1	0.0-0.5	0.09	0.29
E-6-A	Air Dry	AG	Z-2	0.5-1.0	0.09	0.29
E-6-A	Air Dry	AG	Z-3	1.0-1.5	0.08	0.26
E-6-A	Air Dry	AG	Z-4	1.5-2.0	0.17	0.52
E-6-A	Air Dry	AG	Z-5	2.0-2.5	0.16	0.51
E-6-B	Air Dry	BG	Z-1	0.0-0.5	0.08	0.25
E-6-B	Air Dry	BG	Z-2	0.5-1.0	0.11	0.34
E-6-B	Air Dry	BG	Z-3	1.0-1.5	0.07	0.23
E-6-B	Air Dry	BG	Z-4	1.5-2.0	0.05	0.16
E-6-B	Air Dry	BG	Z-5	2.0-2.5	0.05	0.16
E-16-A	Steam	AG	Z-1	0.0-0.5	0.10	0.30
E-16-A	Steam	AG	Z-2	0.5-1.0	0.12	0.38
E-16-A	Steam	AG	Z-3	1.0-1.5	0.11	0.34
E-16-A	Steam	AG	Z-4	1.5-2.0	0.14	0.42
E-16-A	Steam	AG	Z-5	2.0-2.5	0.23	0.71
E-16-B	Steam	BG	Z-1	0.0-0.5	0.07	0.22
E-16-B	Steam	BG	Z-2	0.5-1.0	0.13	0.41
E-16-B	Steam	BG	Z-3	1.0-1.5	0.18	0.56
E-16-B	Steam	BG	Z-4	1.5-2.0	0.17	0.52
E-16-B	Steam	BG	Z-5	2.0-2.5	0.19	0.60
F-6-A	Air Dry	AG	Z-1	0.0-0.5	0.41	1.28
F-6-A	Air Dry	AG	Z-2	0.5-1.0	0.42	1.31
F-6-A	Air Dry	AG	Z-3	1.0-1.5	0.17	0.52
F-6-A	Air Dry	AG	Z-4	1.0-1.5	0.32	0.99
F-6-A	Air Dry	AG	Z-5	1.5-2.0	0.31	0.95
F-6-B	Air Dry	BG	Z-1	0.0-0.5	0.21	0.65
F-6-B	Air Dry	BG	Z-2	0.5-1.0	0.19	0.58
F-6-B	Air Dry	BG	Z-3	1.0-1.5	0.17	0.52
F-6-B	Air Dry	BG	Z-4	1.5-2.0	0.15	0.48
F-6-B	Air Dry	BG	Z-5	2.0-2.5	0.19	0.58
F-16-A	Steam	AG	Z-1	0.0-0.5	0.24	0.75
F-16-A	Steam	AG	Z-2	0.5-1.0	0.18	0.57
F-16-A	Steam	AG	Z-3	1.0-1.5	0.17	0.54
F-16-A	Steam	AG	Z-4	1.5-2.0	0.14	0.42
F-16-A	Steam	AG	Z-5	2.0-2.5	0.19	0.58
F-16-B	Steam	BG	Z-1	0.0-0.5	0.07	0.23
F-16-B	Steam	BG	Z-2	0.5-1.0	0.05	0.16
F-16-B	Steam	BG	Z-3	1.0-1.5	0.09	0.29
F-16-B	Steam	BG	Z-4	1.5-2.0	0.10	0.31
F-16-B	Steam	BG	Z-5	2.0-2.5	0.05	0.16

Boldface indicates substitution for measured value at or below threshold of 0.06 pcf. See Text.

AMERICAN WOOD-PRESERVERS' ASSOCIATION

Table 2 (Cont.) DeQueen Assays 2000

<u>Sample No.</u>	<u>Condition</u>	<u>Location AG or BG</u>	<u>Zone No.</u>	<u>Zone (Inches)</u>	<u>PCP (pcf)</u>	<u>PCP (%)</u>
G-6-A	Air Dry	AG	Z-1	0.0-0.5	0.12	0.38
G-6-A	Air Dry	AG	Z-2	0.5-1.0	0.15	0.48
G-6-A	Air Dry	AG	Z-3	1.0-1.5	0.15	0.46
G-6-A	Air Dry	AG	Z-4	1.5-2.0	0.14	0.44
G-6-A	Air Dry	AG	Z-5	2.0-2.5	0.19	0.59
G-6-B	Air Dry	BG	Z-1	0.0-0.5	0.05	0.16
G-6-B	Air Dry	BG	Z-2	0.5-1.0	0.05	0.16
G-6-B	Air Dry	BG	Z-3	1.0-1.5	0.05	0.16
G-6-B	Air Dry	BG	Z-4	1.5-2.0	0.05	0.16
G-6-B	Air Dry	BG	Z-5	2.0-2.5	0.10	0.30
G-16-A	Steam	AG	Z-1	0.0-0.5	0.15	0.47
G-16-A	Steam	AG	Z-2	0.5-1.0	0.17	0.54
G-16-A	Steam	AG	Z-3	1.0-1.5	0.17	0.52
G-16-A	Steam	AG	Z-4	1.5-2.0	0.16	0.50
G-16-A	Steam	AG	Z-5	2.0-2.5	0.15	0.47
G-16-B	Steam	BG	Z-1	0.0-0.5	0.10	0.31
G-16-B	Steam	BG	Z-2	0.5-1.0	0.05	0.16
G-16-B	Steam	BG	Z-3	1.0-1.5	0.05	0.16
G-16-B	Steam	BG	Z-4	1.5-2.0	0.07	0.21
G-16-B	Steam	BG	Z-5	2.0-2.5	0.08	0.24

Boldface indicates substitution for measured value at or below threshold of 0.06 pcf. See Text.