ACS SYMPOSIUM SERIES 982

Development of Commercial Wood Preservatives

Efficacy, Environmental, and Health Issues

EDITED BY
Tor P. Schultz, Holger Militz, Michael H. Freeman,
Barry Goodell, and Darrel D. Nicholas

AWPA and Building Code Listings for New Preservative Systems

Craig R. McIntyre

McIntyre Associates, Inc.
8565 E. Grandview Lake Dr.
Walls, MS 38680
www.mcintyre-inc.com

Once a new preservative system is under development, consideration must be given to obtaining listings with appropriate bodies to allow commercialization. Both the American Wood-Preservers' Association (AWPA) and the International Code Council (ICC) provide avenues to allow new preservative systems to be added to their respective listings. Both organizations require generally similar testing regimes but there are significant differences in the scope of and the time frames needed for such testing to be accomplished. There are also significant differences in the requirements placed on the testing institutions by the different listing bodies. Both listing procedures and the differences in the two procedures are discussed fully in this chapter.

Why List at All?

Prior to discussing the specifics of the listing process though, some consideration should be given to the need for such listings. To be honest, one can sell wood with a non-listed preservative system in the open market of today. Yet almost all organizations pursuing new wood preservative systems choose to obtain listings from either the AWPA or the ICC. Usually listings are sought from both organizations. One must consider why the proponents of new systems pursue such listings if it is not absolutely necessary.

Historically, non-listed preservatives have had very limited distribution in the marketplace. The systems may enjoy a small, regional market or perhaps a small niche market but the major retailers typically shy away from non-listed systems as too risky. Accessing larger markets then is the first reason.

Obviously, a key component of the risk is that non-listed preservatives would be used in an application where they are not suitable. At the worst, there is the risk that someone would use the preservative treated wood for structural purposes even though structural uses would not be recommended and there would be a failure. Therefore,

non-listed preservatives are further confined to non-structural uses such as fences, mailbox posts and the like. Some companies risk producing wood for decks built close to the ground but generally this application is considered too hard to control. Avoiding some risk is the second reason.

In today's litigious environment, producing or selling a non-listed product leaves one with a very poor defense in this author's opinion. The obvious concern is that the product would be deemed to be "not to industry standards" and hence leave the producer/seller open to a variety of liability issues. In truth, it seems that avoiding some liability issues are the major and third reason that organizations pursue standardization.

The AWPA Process

On the surface, obtaining a listing with the AWPA appears to be a series of simple two-step processes: first, the preservative system itself is listed and then the wood treated with that system is listed. In turn, listing the preservative only requires two steps: first, one defines the system and then one tests that system. System definition also only requires two steps: one describes the chemical system and then an analysis method is provided to ensure that the system meets the description. In regard to the actual testing, one need only consider two general uses: above ground and ground contact applications. Unfortunately, there are many decisions that must be made in this series of considerations for the AWPA listing.

Above Ground Issues

Recently, the AWPA moved from their traditional commodity specifications to "Use Classifications" wherein the actual use of the commodity is considered the defining principle. The AWPA uses a scale of increasing numbers to designate the increasing severity of the use or exposure. For above ground uses, the appropriate designations are:

UC1—Dry interior uses
UC2—Damp interior uses
UC3A—Coated exterior uses
UC3B—Wet exterior uses

Thus, the least hazardous use, UC1, would be applications such as interior walls where the material would be expected to remain dry in service. A slightly more hazardous environment, UC2, would be sill plates or bathroom floors where the material may become damp or occasionally wetted. Still more hazardous would be uses in UC3A such as painted millwork where the coating is an integral part of the protective envelope. Lastly, applications where the wood is continually exposed to the environment and it can become thoroughly wetted such as deck boards, fencing and the like are considered the most extreme of the above ground uses and are in UC3B.

In order to obtain qualification for all above ground uses, it would appear that one must simply fulfill the necessary above ground test requirements for the most severe use, UC3B. Unfortunately, as of this writing, there are no requirements in the AWPA solely for above ground uses. Rather than specify certain tests and/or performance, the AWPA has historically used ground contact testing to determine ground contact retention levels and then factored the above ground retention levels at some percentage of the ground contact level. Granted that this is not very scientific but that is the system in place.

A task group within the AWPA has been working to rectify the procedure and specify tests appropriate for above ground uses. This task group has proposed revisions that delineate the various tests as either “Required” or “Recommended” for the various uses. Within that framework, it would appear that in the near future, the AWPA will have a system that lists the testing required for UC3B.

Assuming that the task group modifications are accepted by the AWPA, the total number of tests that are required or recommended for above ground uses can be outlined as in Table I:

Table I. Number of Above Ground Tests per Use Classification.

Use Class	Efficacy Tests		Depletion Tests		Mechanical/ Chemical Prop.
	Lab	Field	Lab	Field	
UC1	1	1	1	0	5
UC2	2	2	2	1	5-6
UC3A	3	3	2	1	5-6
UC3B	3	3	2	1	6-7

As shown, there is an increasing level of complexity in the testing as one goes from UC1 to UC3B. Complicating the issue is the fact that the costs increase in proportion with the level of complexity and, perhaps worse, the number of years required to complete the testing also increases (see Table II).

Table II. Costs and Time Frames for Above Ground Tests

Use Class	Total Testing Costs	Testing Time, years
UC1	$25-50,000	2
UC2	$30-60,000	2
UC3A	$40-80,000	3-5
UC3B	$50-100,000	3-5

The costs in Table II are out-of-pocket costs paid to the testing organization for conducting the tests. In some cases, there may be additional costs for sample preparation or for travel expenses and so on. As well, it is highly recommended that someone representing the sponsor witness the sample preparation and/or portions of the testing. Some costs can be saved by organizations capable of “in-house” testing since the AWPA traditionally has accepted such testing as being valid, i.e. unbiased.

The testing time cannot be significantly compressed beyond that shown. There is an induction period before any significant attack occurs on the untreated control specimens and failure of the controls is one of the criteria for test validity. The shorter times shown also assume that the sponsor is willing to incur additional costs for conducting the testing in high decay hazard zones such as Hawaii.

Ground Contact Issues

For ground contact uses (AWPA UC4A/B/C), the total testing costs increase to $150-300,000 for the additional tests needed to augment the above ground tests. The time frame for completion of the ground contact testing is 3 to 7 years. In actual fact, the 3 years is overly optimistic but it is the exposure time from a high decay zone that the AWPA considers as the minimum. Typically, most preservative systems brought to the AWPA for consideration have 5 years or more of ground contact exposure data.

It is understood that the "exact" formulation may not be present in the data submitted to the AWPA since minor modifications are expected as the development work continues. However, it is expected that the data will be representative of the final formulation as proposed and that the retentions of active ingredients will span the retentions proposed for listing.

Critical Time Issue

The time lag between the "finalization" of the preservative system and the end of the testing makes it critical that test planning be done as soon as reasonable. For our purposes, reasonable can be defined as that time when the system is well understood but perhaps not in its final form, when it is known that the system is robust and has an excellent chance for success and when it is believed that labeling and registration issues with the EPA will be overcome.

It should be understood that there may still be performance or property problems and that further refinement of the formulation is probably going to occur. Sometimes formulation problems are discovered during the scale-up and repetitive treating done for the testing and it is best to find these earlier rather than later. Some additional costs are going to be incurred as well since it will be necessary to test more retentions or possibly formulation variations than if only the final formulation were tested. However, the slight additional costs are relatively small compared to the lost market opportunity that would be incurred during a wait of several months to a year to fully develop a formulation.

AWPA Submittal

When all of the required testing is complete and the data substantiates the performance of the system, it is appropriate to submit the data to the AWPA for their consideration. In keeping with the two step process, there are two general committees in the AWPA: the Preservatives General Committee (P-General) and the Treatments General Committee (T-General). Within those committees, there are a number of subcommittees that have limited scopes of activity. For preservative systems, the important subcommittees are P3, Organic Systems; P4, Inorganic Systems and P5, Analytical Procedures.

Depending on the system characteristics, a "data package" is submitted to either P3 or P4 and the analytical methodology, if new, is submitted to P5. All of these submittals must be sent 45 days before either the Spring (May) or the Fall (September) meeting of the subcommittees.

The data package follows a common format that initially describes the system, gives the chemical formula (if appropriate) and provides chemical and physical property data. The efficacy test data is given next and typically both graphs and tables are used to

summarize the testing. At the heart of the data package are the proposed retention levels advocated by the sponsor as the minimum above ground and ground contact levels. Naturally, the recommended retentions are the minimum that can be substantiated by the data.

AWPA Voting Process

Once the data package is submitted in a timely manner, a series of votes occurs in the AWPA. In simplistic form, the voting process can be summarized in Figure 1.

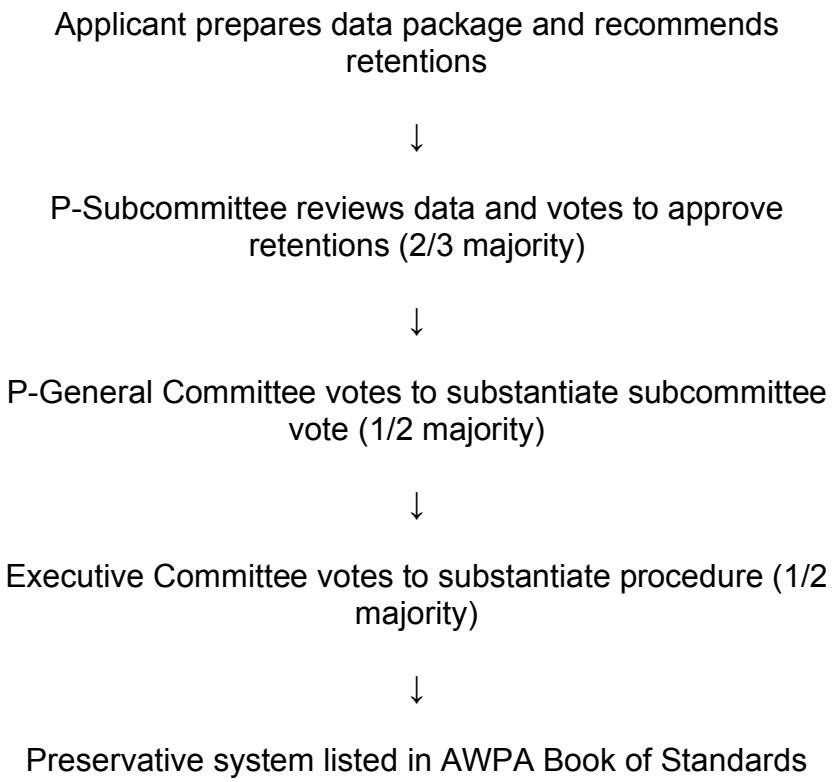

Figure 1. The AWPA Voting Process

The P-Subcommittee vote is perhaps the most crucial and this vote is taken at an open meeting. At that meeting, there is unlimited debate and many of the people on the subcommittee are or will be competitors. If there are any unusual aspects to the data such as poor performance in one of the tests, then the debate can be very heated as to the allowable degree of safety in the recommended retention levels. Frequently, strong arguments are made that the recommended retentions are too low or that there is some other problem with the system under consideration and therefore, the retentions should be raised. For this reason, it is imperative that the proponents or their representatives understand and appreciate the subtleties of the testing protocols if they are to successfully counter these arguments. A recorded vote is taken and all negative voters must submit a technical reason substantiating their vote. It is not necessary for the proponent to address the negatives on this ballot.

Typically, there are 30-40 voters present at the meeting and two-thirds of these must approve the retentions. Although this sounds onerous, this is the typical majority

required by many other consensus-based standard writing organizations such as ASTM-International. In effect though, it means that a one-third minority can and sometimes do control the vote and the proponent must resubmit the proposal. When this happens, the proponent can gather additional data or develop a rational explanation for the errant data or both as needed and resubmit the data package with the same recommended retentions or raise the retentions to some higher value.

If the subcommittee vote is favorable, the issue moves on to a written ballot of the P-General Committee. This allows those members who did not attend the particular meeting where the issue was discussed a chance to vote. Negatives on this ballot must be accompanied by written reasons and any negatives are returned to the originating subcommittee for a determination of persuasiveness. The ballot for persuasiveness must pass by a one-half majority and if successful, the issue moves on to the final vote by the Executive Committee.

The Executive Committee reviews the ballot items to ensure that the proper procedures were followed in resolution of the negatives and that no other procedural errors occurred. The Executive Committee does not consider technical issues and is confined solely to judging procedural issues as given in the AWPA Regulations. Once the Executive Committee has approved the ballot item, then it is immediately listed in the Book of Standards. To facilitate this, the AWPA maintains a web site (www.awpa.org) with the latest updates to the Book of Standards.

New AWPA Procedures

Two new procedures will soon be adopted by the AWPA to help expedite the processing of new preservative systems. The first procedure is that all data packages will undergo a "data screen" to ensure that the package is substantially complete. No judgment is made during the screen about the quality of the data or the level of the retention recommendations. Rather it is intended to only flag out any data omissions so that the proponent is aware of these and can attempt to supply the missing data.

The second change is institution of the AWPA Preservatives Review Board (PRB) as an expedited means for the proponent of a preservative system to obtain expert review of data supporting a proposal for standardization. The three person PRB will be drawn from a pool consisting of impartial, general interest members. At the end of the PRB review, the proponent receives a report with the consensus opinion of the PRB and any minority opinions regarding the recommended retention levels. This report is not binding on the P-subcommittee but it is believed that some of the debate can be lessened if a review by three independent experts is available. There will be a nominal cost of $4000 for the PRB review and this money is used to reimburse the experts for their time.

AWPA Treatment Voting Process

Once the preservative system is listed by the Preservative members of the AWPA, a similar voting process occurs in the Treatments committee to ratify the retention levels recommended to it. In this case, a data package is submitted to the Treatments subcommittee showing that the preservative system can be routinely used in a commercial manner. The proponents must show that the recommended retentions are achievable and that penetration indicators are available for the system. As well, several

lumber species with different treating characteristics should be used in development of the package.

Assuming the treatment data package is complete, the voting process is essentially the same for the Treatments subcommittee and T-General as before. There can be a debate at the subcommittee meeting and then a ballot is taken. If a two-thirds majority is obtained, the proposal goes on to the written ballot of the T-General Committee. If successful, the proposal is then ratified by the Executive Committee and it is listed in the Book of Standards. As before, the negatives on the written ballot must be resolved.

Recognizing that the AWPA process can be somewhat lengthy, an allowance is made for submittal of the P and T data packages concurrently. During each meeting week, the P subcommittees meet before the T subcommittees so it is possible for a system to undergo both votes in the same week. However, in recent years, this has been relatively rare and it typically takes a meeting or two for the membership to become familiar with and comfortable with a new system. Thus, most new systems are not successful at the first meeting and it takes two to four meetings for complete listing to occur.

AWPA Considerations

With this long process in mind, one wonders why the proponents endure. The answer of course is that once listed in the Book of Standards, a preservative system is deemed to be commercially acceptable and "meet" building code standards. This allows access to all major markets for preservative treated lumber.

The Building Code Process

The International Code Council (ICC) is the dominant national code issuing body in the USA. For preservative treated lumber, the two codes of interest are the International Residential Code (IRC) and the International Building Code (IBC). Both of these have various structural applications where treated wood is required to be used. Local jurisdictions typically adopt these codes in whole or augment the codes with local requirements.

ICC Organization

In addition to the main organization, the ICC has three subsidiaries: the International Accreditation Service (IAS), the International Code Council Evaluation Services (ICC-ES) and the ICC Foundation. The Foundation sponsors research programs related to building products and is of no further interest here. However, the other two subsidiaries play major roles in the listing of new preservative systems.

ICC-ES

The ICC-ES provides a mechanism for listing new products that are then deemed as acceptable for the code requirements. Basically, the proponent develops an Acceptance Criteria (AC) that defines the product in a generic manner, specifies the necessary tests used to document the performance of the product and specifies the

limitations as needed for the product. The proponent then gathers the necessary test data and submits it to the ICC-ES who review the data and then issue an Evaluation Service Report (ESR). Upon the issuance of the ESR, the product has been evaluated and found to be in compliance with the code.

An important point is that the proponent is able to select the performance tests and hopefully favors those tests that are already underway. For wood preservatives, the range of tests includes numerous efficacy tests as well as strength and fastener corrosion tests. The efficacy and corrosion tests are usually conducted by AWPA standard methods but recently similar test methods from other organizations such as CEN have been accepted.

Acceptance Criteria

A draft of the AC is due about three months earlier than one of the three ICC-ES meetings per year which are held in February, June and October. A submittal fee of $8100 is required at this time as well. The draft undergoes an internal ICC-ES review and then 30 days before the meeting, it will be published on the ICC-ES web site (www.icc-es.org).

During the 30-day period and at the AC meeting, public comments are welcome on the proposed AC. Usually these comments take the form of “advice on deficient aspects” of the AC such as more strenuous testing is required or more restrictions need to be placed on the product. Sometimes, organizations supply their own test data on similar products. In many respects, the debate at the public AC meeting is very similar to the debate at the AWPA subcommittee meeting. The AC can be and frequently are amended on the floor to accommodate the various comments.

It is absolutely critical that a representative of the proponent be at the meeting who understands the implications of changing the test or test criteria in terms of additional costs and time. The meeting debate is highly technical and there are many references to either code paragraphs or other ACs. The combination of test, code and AC references can sometimes be confusing to the uninitiated so it is best to have a representative who has weathered several AC meetings.

After the comments are heard, the ES committee votes on approving the AC. Most of the time, the AC is approved with modifications but there are a few that are approved without change. An additional option is to table the AC for review and at one recent meeting over one-third of the proposals were tabled. If the AC is approved, then the proponent sets about conducting the various testing specified in the AC.

Testing and Accreditation

The testing specified in the AC is generally the same testing as that required by the AWPA. However, an important distinction is that any testing that was initiated after July 2004 submitted to the ICC-ES must be done at a laboratory accredited by the IAS. Unfortunately, as of this time, there are no laboratories that are accredited by the IAS to perform efficacy testing.

Recognizing this conundrum, the IAS has special provisions for one-time approvals for specific tests. This requires an on-site inspection of the testing facility prior to the test initiation and the proponent is charged about $3000 to cover fees and travel costs.

Evaluation Service Report

After the test data is collected, the various test reports are submitted to the ICC-ES for their review. If there are any anomalies in the data, the proponent is asked for a plausible explanation and if satisfactory, the review is concluded. In some cases though, the test must be repeated. If there are reported field problems with a similar product, the ICC-ES may request additional assurances that such problems will not occur with the current product.

At the conclusion of the review, the ICC-ES prepares and issues an ESR. When this occurs, the product is deemed to meet the requirements of the IBC and IRC. At the end of the ESR, there are typically several restrictions placed on the use of the product to prevent its misuse.

In general, the review takes several months to complete. The shortest time review time span that is known was six months (and I am happy to report that I was associated with this ESR). The longest known is over four years and still running (and I am equally happy to report that I am not associated with this ESR). It should be noted that these time spans are after all the testing is complete.

The initial ESR is issued with a one year expiration date and costs about $6000. After the one year period, the ESR is reexamined for any deficiencies and then reissued with two year reexamination periods. If there are deficiencies, the proponent must address them and the reexamination fees are $5 -10,000.

Above Ground and Ground Contact Issues

The ICC-ES makes clear distinctions in the testing required for above ground versus ground contact uses. It is possible within the ICC-ES framework to obtain an ESR that limits the wood to only above ground applications (AWPA UC3B and less). Since accelerated testing is accepted by ICC-ES for above ground uses, the listing process can be expedited and the proponent can enter the market in a timelier manner. Obviously, the necessary tests would be underway for ground contact listings and the ESR would be amended later when the supporting ground contact data is available.

SUMMARY

Although somewhat formidable at first glance, the procedures for obtaining either AWPA or ICC listing for a new preservative system are reasonably structured and orderly. It should be kept in mind that it may be difficult to obtain such listings though. It can also be somewhat expensive. But it can be done.

The critical aspects for success are to carefully plan the testing regime, select appropriate tests, select appropriate testing organizations and to start as soon as reasonable.