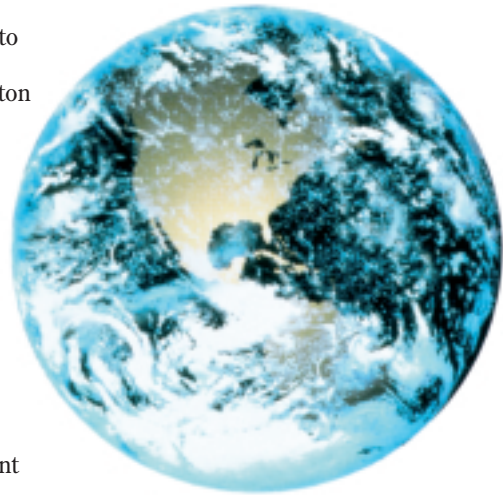


Sustainable wood depends on **boron**

One of the most important functions boron serves is to keep the world green. All plants – from fields of cotton to groves of Douglas fir – depend on trace amounts of boron to thrive. Plants get the boron they need from the land and water supply; it's widely distributed throughout the environment as minerals called borates. People get the boron they need from plants; it's part of a healthy diet.



Although boron is essential for plants, and nutritionally important for humans – it also works to control insects and fungi that attack wood by inhibiting their metabolism. As a result, treating solid and engineered wood products with borates provides long-lasting protection against wood-destroying pests, and is safe for people and the environment.

Research by organizations including the Building Research Establishment in the United Kingdom and the Department of Agriculture in the United States shows that wood has the best environmental attributes among all building materials. In fact, trees' ability to absorb carbon dioxide and emit oxygen make wood the *only* building material that has a positive impact on the environment.

However, wood also has a downside – its vulnerability to organisms such as Formosan subterranean termites, native subterranean termites, wood destroying beetles, carpenter ants and decay fungi, to name a few.

It's not just a nuisance, it's a serious – and growing – economic threat. In 1993, the Wood Protection Council of the United States National Institute of Building Sciences estimated the annual costs of replacing wood damaged by termites and decay to be two billion dollars in the United States alone and that number grows every year. At the same time, consumers are demanding more durable, higher-quality products and homes.

Boron to the rescue

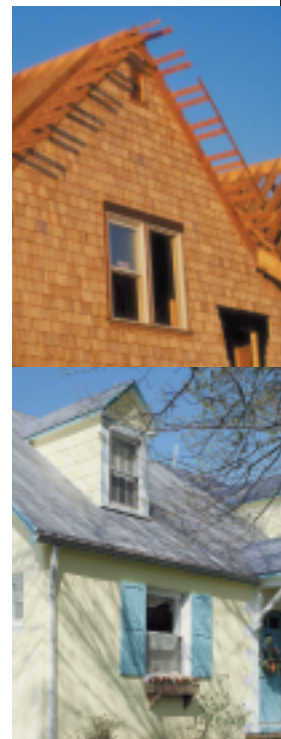
Borates' reputation as a safe and effective defense against wood-destroying organisms is on the rise. Although borates' wood protection properties have been known for centuries, it wasn't until the 1950s that treating lumber with borates became a standard practice in some parts of the world. In addition, countries such as the United States, Canada, Japan and many European countries are increasingly turning to borates to protect their homes.

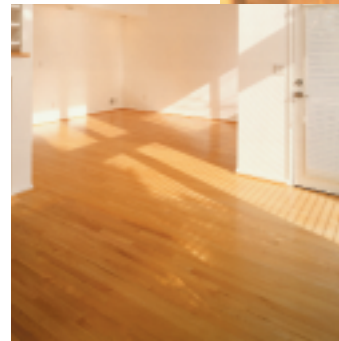
Borates are cost effective and easy to use. Waterborne borate wood preservatives are used in conventional pressure treating plants. Existing plants can be converted to use borates with little or no change to equipment. In some cases, borates are also used in non-pressure treatment systems that rely on the moisture in the wood itself to achieve penetration and loading requirements. In wood composites, borates are added during the manufacture of oriented strand board (OSB), hardboard, particleboard and other engineered wood products.

In treated wood, borates are:

- colorless and odorless so they maintain the physical appearance of wood products
- non-volatile and robust so they don't evaporate or degrade during service
- non-corrosive so many of the nails and metal fasteners used with untreated wood can also be used with borate treated wood.

In short, the use of borate-treated wood in construction doesn't require special tools or handling techniques.





Boron mode of action

Borates work by interfering with the basic metabolic processes in wood destroying organisms, similar to their mode of action in controlling other insects such as ants and silverfish. Because the mode of action is fundamental, borate efficacy is broad spectrum, and target organisms do not develop resistance as they can with conventional pesticides.

Boron's functionality is based on its ability to form complexes with various sugar alcohol compounds such as vitamins and co-enzymes. Reaction of borates with co-enzymes containing these molecules has been found to diminish the ability of organisms to process food and energy, causing the target organisms to "starve" and eventually die. The result: long-lasting wood protection and insect control.

The best way to expose target organisms to borates is to treat their food source or immediate environment. Wood-destroying insects such as termites attempt to eat borate-treated wood. This minor grazing allows borates to be transported as part of the termite's food supply back to the colony, and from one termite to another. Insects such as carpenter ants that burrow into lumber but don't use wood as food are also exposed to borates through contact with borate-treated wood.

When timber is exposed to moisture, decay fungi can infest and destroy wood. Using borate preservatives puts the wood destroying organism in constant and direct contact with the borates. As with insects, the borates in the treated wood interfere with the metabolic processes of decay fungi.

Boron the safe alternative

Today, every aspect of designing and constructing a structure where people live and work is judged on its impact on health, safety, and the environment. Borates have an excellent reputation for safety when used as directed – and that reputation has been built over more than a century.

One reason is that all borate-based pest control methods – including treating lumber and professional powder applications –



confine borate exposure to pests. Another reason is that the levels used in pest applications pose no risk to people or pets.

The fact is, people consume between one to three milligrams of borates as part of a healthy plant-based diet. Our bodies handle borates as they do any nutrient; by using what they need and excreting the rest. Borates do not bioaccumulate in humans or other mammals, and they are not absorbed through intact skin. Even among workers with higher than normal exposure to borates, studies show no negative health impacts over time.

Why does sustainable wood depend on boron? Trees need boron to grow. Wood treaters need borates because they are cost effective and have good environmental attributes. Builders need borate-treated lumber and wood composites because they make homes more durable. Homeowners need borates for peace of mind that their homes are protected from the destruction of termites and decay. It's a natural solution all around.

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