

Technical Bulletin

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MP400-EXT™ ...the new preservative paste formulation from Osmose

MP400-EXT sets a new benchmark for preservatives intended for application to in-service poles. The unique, patent-pending formulation is designed to achieve enhanced performance against decay-causing organisms while reducing levels of toxicity and chemical ingredients. Osmose applied its formulating expertise and application experience to the multi-year R&D effort. **MP400-EXT** is the ideal preservative for today's utilities, responding to environmental and human safety concerns while also helping to preserve natural resources by adding years to pole service life.

Question: “Why did Osmose choose sodium tetraborate decahydrate (borax) for this new preservative paste rather than sodium fluoride (NaF)?”

Answer: Osmose is committed to developing new preservative products that retain a high degree of preservative efficacy while reducing the total volume of pesticides in our products. Sodium fluoride has performed very well for more than 70 years as an active ingredient in several Osmose remedial treatment formulations. Today's COP-R-PLASTIC™ combines NaF with copper naphthenate to protect in-service wood poles and piles from decay and insect damage.

NaF is an effective fungicide and diffuses readily through the moist sapwood of in-service wood poles. Although it exhibits a high degree of mobility, NaF has also proven to be reasonably persistent in the application zone. This made it a good choice for non-pressure, remedial treatment applications. Compared to other options, however, NaF requires slightly higher loadings to control decay organisms.

Borax is a highly effective fungicide. It is known to be more mobile than NaF in wood containing high moisture levels, such as the below grade regions of utility poles. Borax's mobility has been cited in independent studies as requiring more research. In direct ground contact applications, borax may migrate away from the intended treatment zone. Osmose Research addressed the mobility of borax's in its **MP400-EXT** preservative paste. This proprietary formulation is designed to optimize the mobility of borax so that it not only penetrates moist sapwood but also persists at higher levels in the intended treatment zone. The threshold level of sodium borax in a remedial treatment, recently established by the Oregon State University Utility Pole Research Cooperative, is lower than previously thought and lower than NaF. Borax is also less toxic to mammals than is NaF.

Borax's fungicidal properties, lower threshold and toxicity levels, together with Osmose's proprietary formulation designed to optimize its mobility, made it the logical choice for this new preservative.

Question: “Oxine copper (Copper 8) is listed as an oilborne preservative in AWWA standards. How did you formulate it as waterborne? Can you expect it to perform as well as oilborne formulations?”

Answer: Oxine copper is practically insoluble in most widely used organic solvents and its solubility in water is very low. Therefore, it would not be expected for the oxine copper in this non-pressure application to penetrate sapwood in the manner demonstrated by NaF or borax. Creosote contributed significantly to the efficacy of the original OsmoPlastic formulation by providing a surface barrier of protection. Oxine copper's role in **MP400-EXT** is comparable, providing enhanced resistance to external decay with a surface reservoir of preservative.

Osmose has applied for patent protection for a technology that allows the direct injection of submicron copper particles into wood, without the need for solvents. Osmose used this proprietary technology to develop a waterborne **micronized oxine copper** formulation that is used in **MP400-EXT**. The chemical and physical properties of micronized oxine copper allow it to provide effective surface protection in waterborne formulations in spite of its low solubility.

“Oxine copper gained widespread acceptance in a variety of non-pressure applications because of its excellent biocidal properties and low toxicity.” (Nicholas, Barnes and Amburgey, 1991) Its stability, low toxicity and high biocidal activity make it an attractive choice as an active ingredient in a multi-active, remedial treatment formulation. Research and commercial use history as a brush-on preservative have demonstrated that oxine copper is effective against soft rot fungi and is an effective wood preservative at very low retention levels.

The micronized oxine copper in **MP400-EXT** is expected to provide protection against soft rot decay while creating an antagonistic environment against other wood destroying fungi. Deep penetration into sapwood is not required to provide this protection. Osmose specifically chose micronized oxine copper because of its low toxicity and excellent fungicidal properties. **MP400-EXT** combines oxine copper with tebuconazole, bifenthrin and borax to provide formidable protection against a broad spectrum of decay-causing organisms.

Question: “Three of your four active ingredients are included in very small quantities. I thought that it was desirable to have a high percentage of active ingredients in brush-on remedial treatments?”

Answer: Recent advancements have redefined accepted best practices in most fields of science and research intensive industries. In medicine, dosages have been reduced for many therapies and prescriptions. “More is better” was a generally accepted rule for the past, but not for all of today’s products.

Osmose announced its product development intentions in “The Environmental Policy Statement of Osmose Utilities Services, Inc”, published in 2003. That memorandum stated that “we will exercise opportunities to replace active ingredients that create an exaggerated perception of risk when effective alternatives are available....Osmose will develop, manufacture, distribute and apply preservatives that present the minimum risk to the environment.....”

The threshold level of a preservative is the amount needed to control target organisms, typically expressed in pounds per cubic foot of wood. Osmose selected active ingredients that are very high in fungicidal activity but very low in toxicity for **MP400-EXT**. Creating non-pressure formulations with these type ingredients requires a high level of expertise and experience. The benefits to pole owners, applicators and the public are effective decay control, smaller quantities of pesticides and reduced toxicity. In fact, **MP400-EXT** has achieved the lowest toxicity profile and EPA label signal word of any similar product, reflecting its lower toxicity to mammals.

The patent-pending tebuconazole/bifenthrin combination serves as an example of Osmose’s product development philosophy and leadership. In five-year stake tests, this combination achieved effective fungal and termite control at loadings of 0.018 to 0.0038 pounds per cubic foot of wood (pcf). Similarly, oxine copper demonstrated control against the *Lenzites trabis* fungus at 0.0045 pcf (Nicholas *et al.* 1991). Preservatives such as creosote require 5.0 pcf to achieve control. The lower threshold levels of these new compounds allow for greatly reduced levels of active ingredients in an effective remedial treatment. For example, tebuconazole/bifenthrin demonstrated control at levels that were 1/20th of CCA loadings. Oxine copper demonstrates fungal control at levels that are 2/1000ths of creosote’s stated threshold.

Question: “Tebuconazole, borax and oxine copper have not traditionally been used for ground contact applications. How do you expect these preservatives to perform in a ground-contact application?”

Answer: The listing of a preservative system in AWPA standards for above-ground applications does not reflect an ability or inability to perform well in ground contact applications at different retention levels or in different formulations. Often, commercial considerations such as the lower cost of competing products determine manufacturers’ strategies when approaching AWPA’s standardization process.

Five year field stake tests demonstrate that relatively low retention levels of a tebuconazole/bifenthrin solution perform well in ground contact. In their 1991 paper, Nicholas, Barnes, Amburgey and Stokes concluded that oxine copper as a solitary ingredient is an effective ground contact preservative, is effective against soft rot fungi, but that control is highly dependent on the formulation.

The synergy created by this unique combination of four active ingredients – micronized oxine copper, tebuconazole/bifenthrin and borax – together with the proprietary formulation technology developed by Osmose Research, produces a robust remedial treatment that delivers enhanced efficacy, reduced toxicity and reduced quantities of chemical active ingredients.

Question: “Why should I switch to **MP400-EXT for my pole maintenance program?”**

Answer: The **MP400-EXT** formulation represents the state-of-the-art in remedial treatment development and should be the product of choice for pole owners. Individually, each ingredient has been thoroughly researched and tested and shown to be effective. Together, the four ingredients combine to create a powerful barrier against wood-destroying fungi and insects. Five year stake tests have proven the synergy effect achieved by combining tebuconazole with bifenthrin. The addition of oxine copper and borax to this formidable combination enhances control against a wide variety of decay-causing organisms.

Additionally, the reduced toxicity of **MP400-EXT** represents modern wood preservative science at its best, responding to the demands that society is placing on the utility and wood preserving industries. The ingredients selected present lower levels of risk than alternative products and produce near zero volatile organic compounds (VOC) emissions.

Because **MP400-EXT** is a break-through product we expect and welcome questions and requests for more information. Please contact your local Osmose sales representative or Kevin Niles at kevin.niles@osmose.com.