Disclosed are methods and compositions for preventing or minimizing staining of lumber having a water-repellent coating thereon, during transit, particularly during rail and ship transit, under conditions of exposure to iron contaminants by adhering to the coated surface of the lumber an essentially ationic deposit of exposed particles of a slow-leaching base in an amount sufficient to maintain the coated surface of the lumber at a pH at about 10 or above for the period of transit.

10 Claims, No Drawings
ANTI-STAIN TREATMENT FOR WATER-REPELLENT COATED LUMBER IN TRANSIT

This application is a continuation-in-part of U.S. application Ser. No. 142,791 filed May 12, 1971, now U.S. Pat. No. 3,756,850 the disclosure of which is incorporated by reference.

This invention relates to methods and compositions especially adapted for coating water-repellent treated lumber to prevent staining of the coated lumber during transit and subsequent storage periods. More specifically, this invention relates to compositions and methods for preventing or controlling the degradation of lumber through color changes resulting from undesired chemical reactions.

An unusual problem has been encountered when the freshly cut lumber is transported great distances by rail under conditions where the lumber is exposed to rain, snow, mist, dew, fog, salt water and sunshine and other elements of weather. Under these conditions, the lumber is observed to darken to a brown or black color. This darkening condition is known "rail transit stain" or merely "transit stain." Up to now, transit stain was accepted as an inherent problem in the transportation of lumber by rail. To a lesser extent, transit stain forms on lumber transported by rail or truck when the lumber has a prior history of rail transit. Apparently air currents carry iron dust from the rail car wheels and the brake car shoes to the lumber. Staining will begin when atmospheric moisture such as rain or dew contacts the iron-contaminated wood. Thus, if no moisture is encountered during transit, staining could develop upon exposure to moisture while sitting in a lumber yard after exposure to iron dust during transit. The iron dust which was deposited during transit did not cause the immediate darkening because sufficient free moisture was not available for the reaction to proceed. Accordingly, there is a need to protect lumber from transit staining for at least the period of transit, and if necessary for the period of storage thereafter. For practical purposes, then, it is often necessary to protect lumber from transit staining over a period of up to three months.

Freshly cut or green lumber from trees such as redwood, cedar, spruce, fir, pine and hemlock contains wood acids, tannins, lignins and other chemicals which react with environmental chemicals to form new compounds the color of which are generally unlike that of freshly cut lumber. Green lumber is rather acidic in nature due to the relatively high content of wood acids and when wetted by rain, forms a suitable vehicle for dissociation of certain metals, such as iron, into their ionic state. When this occurs, certain chemical reactions result which produce chemical discoloration on the lumber surface wherein the lumber becomes darkened. Continued exposure of the wood allows the reaction to penetrate the surface and at the same time increases the discoloration on the surface.

One method of preventing transit staining is to wrap the lumber with paper or other protective covering material to physically shield the lumber from the elements. This method is time consuming, costly, inconvenient, and undesirable from an ecological point of view because the wrapping materials, which are often tar or asphalt impregnated, must be burned or otherwise disposed of.

Attempts have been made in the past to prevent transit staining by providing the lumber with a water-repellent coating. It was theorized that the water-repellent coating would keep the moisture from contacting the wood and thereby prevent the chemical reaction responsible for the transit stain. While this approach is apparently theoretically sound, it has not been successful from a practical standpoint because transit stain has been observed on lumber treated with water-repellent coatings. The observed transit stain on water-repellent treated lumber is not as severe as in the case of untreated lumber, but it nevertheless renders the lumber unsuited for many commercial applications.

The reason for the lack of success of the water-repellent coating is not understood, although it is suspected that the water-repellent coating is not a continuous film and moisture reaches the wood through flaws and defects in the coating and transit stain results. For example, a rail carload of lumber that has been treated with a waxy type of water-repellent coating was observed to have discrete areas of transit stain. These areas are formed when drops of water accumulate on the water-repellent coating. Due to the nature of the water-repellent coating, the droplets "bead up" on the coated surface of the lumber. When these beads evaporate, a definite area of transit stain remains where the beads had been.

Despite these disadvantages in the water-repellent treatment approach to preventing transit stain, many lumber people believe that water-repellent coatings have sufficient advantage from other standpoints (i.e., protecting the dimensional stability of the lumber) that the water-repellent coatings are justified. Accordingly, the present invention provides a method for preventing transit stain on such water-repellent treated lumber.

As used herein, the term "water-repellent coating" refers to coatings that cause water to "bead up" and form droplets rather than spread out as a film. Such water-repellent coatings include the conventional thermoplastic and thermostetting resinous polymers (including homopolymers, copolymers, terpolymers, etc.), resinsous coating such as polyolefins (e.g., polyethylene, oxidized or emulsified polyethylene and polypropylene); natural or synthetic waxes such as paraffin wax, carnauba wax and petroleum wax; metallic salts of fatty acids such as zinc and aluminum stearates, octoates, and palmitates; ammonical zinc compositions, modified or unmodified polyesters (e.g., the ethylene glycol/maleic/phthalate styrene type and glycerol phthalate type including those known as alkyls); shellac; petroleum resins; natural resins; epoxide resins, phenol formaldehyde resins; allyl resins; polystyrene resins; polymides such as nylon; vinyl resins such as polyvinyl chloride, polynylidene chloride, polynyl acetate, polynylchloride-polynyl vinyl acetate resins, vinyl chloride-styrene resins, vinyl chloride-butadiene resins, vinyl chloride-acrylonitrile resins; acrylic acid and acrylic ester polymers such as polymethyl methacrylate, and methyl methacrylate-styrene; acetal polymers and copolymers; chlorinated rubber; acrylonitrile-butadiene-styrene polymers; isoprene polymers; butadiene-styrene copolymers; polyvinyl butyral resins; styrene-ethylene copolymers; polyfluoroethylene resins, polyvinylidene fluoride resins and polyurethane resins.
These resins are applied to the lumber to form water-repellent coatings in the form of solvent solution (e.g., in aromatic hydrocarbons such as toluene and xylene; aliphatics such as hexane, octane or even cycloaliphatics such as cyclohexane; alcohols such as methanol and ethanol); or even in solution in a vinyl monomer polymerization with ethylenic unsaturation present in the film-forming resins), water solution or aqueous latex depending on chemical and physical conditions.

Several latices used for water-repellent coatings for lumber are available commercially. These include butadiene-styrene latices (Latex 512R, Dow Chemical) containing 35 to 55 percent total solids; vinyl chloride latices containing 50 to 55 percent total solids; vinylidene chloride-acrylonitrile copolymers (Saran F122-A15, Dow Chemical); polystyrene latices containing 35 to 45 percent solids; vinyl ester latices such as polyvinyl acetate containing 40 to 55 percent total solids (Gelva S-55, Shawinigan); latices of polyvinyl acetate-polyvinyl chloride (resyn 2507, National Starch) containing 40 to 50 percent total solids; butadiene-acrylonitrile copolymers (Hy car 1577, Goodrich); styrene-acrylonitrile latices, poly(methylacrylate) latices and butadiene-acrylonitrile ester latices. The latices usually have an average molecular weight in the range of about 25,000 to about 100,000. The chemical nature of the water-repellent coating is not significant and the present method prevents transit staining in all types of water-repellent coatings on lumber.

In my Canadian Pat. No. 756,052, a method is disclosed for keeping the lumber surface at an acid pH such as with oxalic acid so that the appearance of freshly milled wood remains for an extended period of time. The oxalic acid reacts with contaminants to form oxalate salts which closely approximate the color of wood. Unfortunately, some oxalate salts are water soluble and with heavy rain the oxalate salt may be washed away leaving the wood susceptible to further staining. Thus, the present invention represents an advance over my Canadian Pat. No. 756,052 in providing a different mechanism for preventing transit staining.

U.S. Pat. Nos. 3,333,977 and 3,333,978 propose acidic anti-staining coating for redwood and cedar comprising certain polyester resins together with water-soluble salts, oxidizing agents, organic peroxides and water-soluble acids for prevention of sap staining. This proposal does not apply to and is not effective against transit stain.

U.S. Pat. No. 3,565,681 concerns a method of preparing anti-rust paper for use as labels on metallic containers. These anti-rust papers are provided with a coating of calcium hydroxide, water-dispersible adhesive compatible with the calcium ions and selected from the group consisting of starch, protein, synthetic binder and mixtures thereof. This patent does not concern the problem of transit staining on lumber.

U.S. Pat. Nos. 2,818,344; 3,085,893 and 3,033,700 disclose the use of certain barium borate pigments in paints for the purpose of promoting cleaner, long-lasting films. The films are of the paint type which encapsulate the pigment so that the pigment is not "exposed to the elements but rather is embedded in the paint film." These patents do not discuss the formation of transit stains on lumber or the prevention of stain. The barium borate pigments disclosed in these three patents are used in the percentage of 2 to 20 percent of the paint for the purpose of inhibiting mold growth. The barium pigments disclosed in these three patents are suitable for use as alkaline-earth base in the practice of the present invention, and accordingly the teachings of these three patents is incorporated by reference.

It has now been discovered that this rail transit stain can be eliminated or materially reduced in lumber having a waterrepellent coating thereon by adhering to the exposed coated surfaces of said lumber at an exposed essentially atciotorial deposit of a particular base which is slowle leachable upon exposure to atmospheric moisture to produce a basic extract solution having a pH of about 10 or greater. The deposit is adhered to the water-repellent coating lumber in an amount sufficient to maintain the pH of at least a substantial portion of the exposed surface above about 10 for the period of transit. Thus, the present invention is completely contrary to the prior methods of maintaining the freshly cut appearance of the lumber wherein the wood surface was maintained at an acid pH to prevent staining. The binder is used merely to fasten or glue the base particles to the water-repellent coated lumber and keep the particles from being physically dislodged by the forces of handling or shipping or by the physical force of the wind and rain.

The deposit is in no sense of the word a "paint" because the deposit is intentionally "binder starved" or "pigment rich" so that the deposit particles are exposed for leaching with atmospheric moisture. Paint has been defined as a pigmented liquid composition which is converted to an opaque solid film after application as a thin layer.

In the context of the present invention, it is more appropriate to think of the binder as an adhesive to distinguish from the term "binder" as it is used in describing paint films. In fact, an adhesive which is also water repellent is ideal so that it will not be washed away during heavy rainfalls.

The exact chemical mechanism responsible for the effectiveness of the present invention is not completely understood, although it is strongly suspected that the actual cause of transit staining in lumber is the chemical reaction occurring between the wood acids, tannins and other chemicals in the wood with the ambient iron contaminants that penetrate the waterrepellent coating in the presence of atmospheric moisture to produce brown or black iron compounds on the lumber surface. Surprisingly, iron oxide in pigmented form as ferric oxide does not react with the wood to form discolored products. In fact, yellow and red iron oxide pigments can be used to tint the inventive coating to closely match the wood color. Apparently, only metallic iron is responsible for transit staining.

The iron contaminants come from the iron and steel transportation equipment. For example, railroad car brakes under friction release significant quantities of iron particles in the form of dust. The friction of the steel railroad wheels on the railroad tracks can result in the release of metallic iron dust. Moreover, steel transportation compartments as well as the chains and straps for securing the lumber to the compartment are sources of iron contaminants. In the presence of rain and moisture, these iron contaminants react with the wood acids to produce the brown or black stain on water-repellent coated wood surfaces. Whatever the exact chemical mechanisms, the freshly cut lumber can be
prevented from transit staining by maintaining the pH of the water-repellent coated lumber above about 10 for the duration of exposure.

To maintain the surface of the water-repellent coated lumber at a pH of about 10 for the duration of the journey, the exposed surface is buffered by adhering an essentially atinctorial deposit of slow-leaching (i.e., having a solubility of at least about 0.001 percent in water at 32°F) base particles which are slightly or moderately soluble in water (e.g., having a water solubility of less than about 50 percent by weight at 32°F, but greater than about 0.001 percent). If the base were too water soluble, the deposit should be dissolved during the first rain to leave the water-repellent coated lumber unprotected for the remainder of the period of exposure; although this may be acceptable for short periods of exposure.

The term “atinctorial” as used herein means that the base does not have a tendency to react with the wood to tint it from its natural color. In other words, the base is neutral with respect to color, although colorants and tints can be added to the coating composition for the purpose of color coding or to highlight or approximate the natural color of the lumber.

The term “base” refers to a compound which yields hydroxyl ions in aqueous solution. These base particles due to the slight or moderate solubility are slowly leachable with atmospheric moisture to form a basic buffer solution which prevents the iron from reacting with the wood chemicals to form a stain. Usually at least a portion of and preferably all of the base particles have solubility in water of less than about 10 percent by weight at 32°F and preferably less than 1 percent at 32°F.

When the water-repellent coated lumber requires protection for prolonged periods of up to several months, at least a portion and preferably all of the base particles having a water solubility of about 0.001 percent to about 0.5 percent by weight are particularly effective so that the particles are very slowly leachable with atmospheric moisture to yield a buffer solution on the surface of the lumber throughout the period of exposure.

Suitable atinctorial slowly leachable bases are alkaline-earth metal bases which include oxides, carbonates, phosphates, hydroxides, borates, borosilicates and hydrates of the same of the alkaline-earth metals magnesium, calcium and barium such as barium oxide (BaO), barium carbonate (BaCO₃), barium hydroxide [Ba(OH)₂], barium hypophosphate (BaPO₄), barium monohydrogen orthophosphate (BaH₂PO₄), barium metasilicate (BaSiO₄), barium orthoborate (3BaO - B₂O₃), barium metaborate (BaO - B₂O₃), barium octaborate (BaO - 8B₂O₃), barium borosilicate (3BaO - 3B₂O₃ - 2SiO₂), magnesium carbonate (MgCO₃), magnesium carbonate hydrates (MgCO₃ - H₂O and MgCO₃·5H₂O) and other barium borates and barium borosilicates described in U.S. Pat. No. 2,818,344; basic magnesium carbonate [MgCO₃·Mg(OH)₂·3H₂O and 3MgO·Mg(OH)₂·3H₂O], magnesium oxide (MgO), magnesium acid carbonate (MgHCO₃), magnesium hydroxide [Mg(OH)₂], magnesium orthophosphate [Mg₃(PO₄)₂·4H₂O], magnesium monohydrogen orthophosphate [MgHPO₄·3H₂O]; calcium tetraborate (CaB₄O₇), calcium carbonate (CaCO₃), calcium hydroxide [Ca(OH)₂], calcium oxide (CaO), calcium orthophosphate [Ca₃(PO₄)₂], calcium monohydrogen orthophosphate (CaHPO₄·2H₂O), calcium carbonate (CaB₄O₇), calcium monohydrogen orthophosphate (CaHPO₄·2H₂O), calcium carbonate (CaB₄O₇), calcium monohydrogen orthophosphate (CaHPO₄·2H₂O). Other slow leaching bases include trisodium phosphate, sodium carbonate, sodium sesquicarbonate, borax and sodium bicarbonate. These slow-leaching bases are often used to supplement the alkaline-earth bases.

The particle size of the base particles is not particularly critical as long as the particles are in the size range generally used for pigmentary purposes. The average particle size for these purposes is usually less than 50 microns and preferably about 1 micron to about 15 microns. The bases can be supplemented with watersoluble bases (i.e., those bases having a solubility in water in excess of 50 percent by weight at about 32°F) such as sodium and potassium hydroxides, ammonium hydroxide and so on in the proportion of up to 50 percent by weight of the total base when the particular type of wood can withstand such watersoluble bases without reacting therewith to form stains.

The base deposit is adhered to the lumber with a suitable binder or adhesive as a “wash coat” rather than a paint. The purpose of the binder here is not to encase or encapsulate the base particle to form a conventional paint coating, but rather adhere or glue the deposit to the lumber so that it will not be dislodged from the lumber by the forces of the rain, wind and normal abrasion occasioned during the course of the journey. The binder should not be present in an amount that would tend to encapsulate the deposit thus acting as a barrier between the atmospheric moisture and the particle to prevent or inhibit leaching.

Pigments and fillers can also be used in admixture with the base particles to obtain properties such as thixotropy, coloration, stability and other properties. Thus, supplemental pigments such as titania, silica, iron oxide, zirconia and other pigmentary or filler materials can be included in the coating composition along with the base and binders.

The binder can be any thermoplastic or thermosetting composition in solution, dispersion, suspension or emulsion in organic or aqueous solvent. The selection of the binder is not particularly critical as long as the binder is compatible with the base particles, “wets” the water-repellent coating, and is capable of curing to adhere the deposit of particulate base to the water-repellent lumber substrate. Curing as used herein means that the binder forms as adherent residue on drying, heating or otherwise processing. Curing does not necessarily infer cross-linking exclusively, but it can include coalescence as upon drying a latex.

Suitable film-forming binders include the natural or conventional pigment binders such as casein; glues, gelatin; starch; polyvinyl alcohol; gums and cellulose esters and ethers (e.g., carboxy methyl cellulose, sodium carboxy methyl cellulose, cellulose acetate and hydroxy ethyl cellulose). Some of these binders tend to be water sensitive or water soluble and are usually used with water-insoluble binders. The binders can be of the same type as the water-repellent coating materials mentioned above and are applied directly thereover. These binders are in a vehicle which “wets” the water-repellent coating on the lumber so that there is no tendency to “bead up” on the water-repellent coating which results in localized deposits of atinctorial slow-leaching base. Such a vehicle can be a solvent solution (e.g., in aromatic hydrocarbons such as toluene and xy-
lene; aliphatics such as hexane, octane or cycloaliphatics such as cyclohexane; alcohols such as methanol and ethanol, or even in solution in a vinyl monomer polymerization with ethylenic unsaturation present in the film forming resins). Water solution or aqueous latex can be used if they contain sufficient wetting agent so that the water-repellent coating "wets out" rather than "beading up." Usually organic solvent vehicles are used for efficiency and economy.

For application, a coating composition comprising a slurry or dispersion of base particles (with or without pigments and fillers) and binder in an aqueous or organic solvent carrier is prepared according to the usual mixing techniques for preparing conventional pigment in binder dispersions using conventional anti-foam agents, dispersing agents, wetting agent and emulsifi-

ers, as required, so that the coating "wets" the water-repellent coated lumber.

The coating composition can be prepared in the form of a concentrate of the base particles in binder and carrier containing as much as 2 to 75 percent by weight of base particles for subsequent dilution with water or solvent at the point of application. The base particle concentration of the coating as applied to the lumber is about 0.1 to 10 percent by weight and preferably about 0.1 percent to about 5 percent by weight of the coating composition together with sufficient binder to adhere the base particles to the water-repellent coated lumber. About 1 part by weight of binder is sufficient to bind up to 10 parts by weight of base particles plus pigment (if any). Usually about 1 part by weight of binder is used for every 1 to 6 parts by weight of base particles plus pigment to achieve effective adhesion to the lumber.

The coating composition can be applied to the water-repellent coated lumber by conventional coating means, such as brushing, spray coatings, roller coating, dip coating, air doctoring and the like. For most applications where the period of exposure is up to six months, the coating composition is applied to the surface of the lumber to be protected in the proportion of about 0.001 U.S. gallon/foot² to about 0.01 U.S. gallon/foot² of water-repellent coated lumber surface. Preferably for efficiency and economy, the application rate of coating composition to the lumber surface is about 0.003 to about 0.006 U.S. gallon/foot².

The following example illustrates the practice of the invention. All parts are parts by weight, all percentages are weight percentages and all temperatures are degrees F, unless otherwise indicated.

**EXAMPLE**

**PART A**

A concentrate for a water-repellent coating composition is prepared by thoroughly blending the following ingredients in an agitated vessel at a temperature between 80° and 100°F, until a stable dispersion is formed:

<table>
<thead>
<tr>
<th>Ingredient</th>
<th>Parts</th>
<th>Percent By Weight (Approximate)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water</td>
<td>2,850</td>
<td>59</td>
</tr>
<tr>
<td>Anionic polyelectrolyte dispersing agent</td>
<td>118</td>
<td>2</td>
</tr>
<tr>
<td>Brown oxide pigment</td>
<td>550</td>
<td>11</td>
</tr>
<tr>
<td>Hydroxyethyl cellulose thickener</td>
<td>16</td>
<td>0.3</td>
</tr>
<tr>
<td>Ammonium hydroxide</td>
<td>7</td>
<td>0.1</td>
</tr>
<tr>
<td>Triethanol amine</td>
<td>40</td>
<td>0.7</td>
</tr>
<tr>
<td>Emulsified paraffin wax having a melting point of 125 to 135°F, and an average particle size of 1 to 2 microns</td>
<td>1,300 of wax solids</td>
<td>27</td>
</tr>
</tbody>
</table>

This coating concentrate composition is brown in color and suitable for dilution with water for application at the lumber mill. The coating concentrate composition is diluted for application with water in the proportion of 9 parts of water to 1 part of coating concentrate. The diluted coating composition is sprayed with a spray-gun type applicator onto the exposed surfaces of freshly cut 2 × 2 inches pine lumber in an amount sufficient to yield a water-repellent coating when the coating dries. When water droplets are placed on the water-repellent wood, they form "beads."

**PART B**

A coating composition for direct application to the water-repellent coated lumber of Part A is prepared by thoroughly blending the following ingredients in an agitated vessel at a temperature between 80° to 100°F, until a stable dispersion if formed. This coating composition "wets" the water-repellent coated lumber and is ready for direct application to the water-repellent coated lumber as is, and requires no further dilution at the point of application. Furthermore, this coating composition is adapted for use at very low temperatures below the freezing point of water in that the carrier is an organic solvent (mineral spirits), so freezing is not a problem.

**PART B**

<table>
<thead>
<tr>
<th>Ingredient</th>
<th>Parts</th>
<th>Percent By Weight (Approximate)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Particulate Base and Pigment</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lime (calcium oxide having a particle size of 100% passing 35 mesh and 79% passing 350 mesh)</td>
<td>9</td>
<td>2.5</td>
</tr>
<tr>
<td>Alkaline-earth base [barium borate pigment (BaB₂O₄, H₂O) having a specific gravity of about 3.3, solubility in water of 0.4%, maximum at 70°F, and an average particle size of about 5 to 10 microns]</td>
<td>13</td>
<td>3.5</td>
</tr>
<tr>
<td>Water-dispersible white pigment grade rutile titanium (pigmentary particle size and quality)</td>
<td>2</td>
<td>0.5</td>
</tr>
</tbody>
</table>
During the blending, the petroleum hydrocarbon wax disperses in the mineral spirits to yield a coating composition having a specific gravity of about 0.85 containing about 9 percent by weight of non-volatile materials. The coating composition is sprayed with a spray-gun type applicator onto the exposed surface of water-repellent coated lumber of Part A loaded for rail shipment in an open flatcar of steel construction in a train of similarly loaded flatcars. The coating composition is sprayed at the rate of 0.005 to 0.004 U.S. gallon/foot² of exposed coated lumber surface at ambient outdoor temperature of about 70°F. Upon standing the solvent dries to leave a deposit of lime, barium metaborate and white titania pigment adhering to the water-repellent coated lumber by the petroleum wax binder. The white titania pigment gives the coating an appearance of a very dilute whitewash coating. The titania pigment is used so that the treated areas can be distinguished from the untreated areas.

The trainload of treated lumber travels a distance of 2,000 miles in exposed condition in the open flatcar over a 2- to 3-week period. At the end of the journey, transit stain is not visible on the lumber treated by both Part A and Part B, while water-repellent lumber treated by Part A only has a dark brown "spotty" stain on the water-repellent coating. The brown stains are apparent in those areas where water droplets have evaporated. The surface pH on the lumber treated by Parts A and B is tested by moist pH paper and is observed to be between about 10 and 11. This example shows the combination of lime and barium metaborate are effective as the particulate base in retarding transit stain in water-repellent treated lumber. When this example is repeated, except that borax or calcium oxide or magnesium oxide are substituted for the barium metaborate as the base, similar results are obtained.

Similar results are obtained when this example is repeated using a 10 percent by weight aqueous emulsion of polyolefin wax such as an emulsifiable polyethylene wax having a melting point of 213° to 221°F. and an Acid Number of 14 to 17 sold by Allied Chemical under the name AC polyethylene 629 in the water-repellent coating of Part A.

Similar results are also obtained when a butadiene-styrene latex such as Latex S12R by Dow Chemical containing 40 percent solids; or a vinyl chloride latex containing 50 percent solids; or a polystyrene latex containing 40 percent solids on a polyvinyl acetate latex containing 50 percent solids such as Gelva S-55 sold by Shawinigan; are substituted on an equivalents solids basis in the water-repellent coating of Part A.

Similar results are also obtained when the procedures of Examples 5, 6, and 7 of copending application Ser. No. 142,791 are repeated except using lumber that has a water-repellent coating thereon.

Having thus described the invention, what is claimed is:

1. In the transit of lumber by rail wherein said lumber has a water repellent surface coating thereon and exposed surfaces of said lumber so coated have a tendency for transit staining by metallic iron, the method for reducing the tendency for discoloration of exposed coated surfaces and permitting unwrapped transit of the lumber which comprises the steps of:

applying to said exposed coated surfaces a suspension containing about 0.1 to about 10 percent by weight of a relatively water-insoluble particulate base, binder and a vehicle therefor wherein the weight ratio of binder to base particles plus pigment, if any, is in the range of about 1 part binder per 1 to 10 parts base particles plus pigment, said vehicle being a compound which wets the water-repellent coating and being employed in sufficient amount to prevent beading of said suspension on the coating.

curing said binder after application to produce a binder-starved layer on said exposed surfaces from which said particulate base is slowly leachable by water,

said base particles being anionic and present on said surfaces in an amount to maintain said surfaces at a pH above about 10 for the period of transit,

said suspension being applied to the exposed coated surface of the lumber in the proportion of about 0.001 to about 0.01 U.S. gallons per foot², said base having a solubility in water of at least about 0.001 percent but less than 10 percent at 32°F.

2. The method of claim 1 wherein at least a portion of said base has a water solubility between about 0.001 percent and 1 percent by weight in water at 32°F.

3. The method of claim 1 wherein said base is an alkaline-earth base selected from the group consisting of oxides, carbonates, phosphates, hydroxides, borates, borosilicates and hydrates thereof, of magnesium, calcium and barium.

4. The method of claim 1 wherein said coating composition contains about 0.1 percent to about 5 percent by weight of said base particles.

5. The method of claim 1 wherein the weight ratio of binder to base particles plus pigment is in the range of
about 1 part binder per 1 to 6 parts of base particles plus pigment.

6. The method of claim 1 wherein said suspension is applied to the surfaces of the lumber in the proportion of about 0.003 to about 0.006 U.S. gallons per foot².

7. The method of claim 1 wherein said base has a solubility in water of at least about 0.001 percent to about 0.5 percent at 32°F.

8. The method of claim 1 wherein said suspension is prepared from a concentrate of the base particles in binder and carrier, such concentrate containing about 2 percent to about 75 percent by weight base particles.

9. The method of claim 1 wherein said vehicle comprises wetting agents and emulsifiers so that the suspension wets the water-repellent coating.

10. The product prepared by the method of claim 1.

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