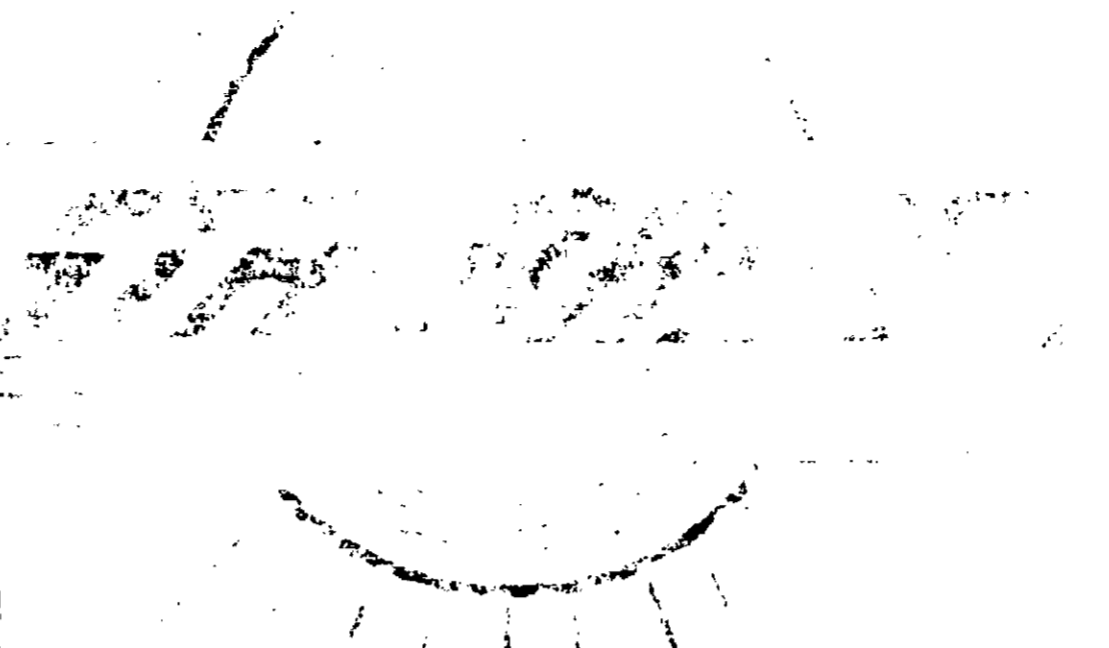


ACCEPTED



ACTIVE INGREDIENTS:

Sodium pentachlorophenate.....	5.00%
Sodium salts of other chlorinated phenols.....	1.00%
Sodium tetraborate decahydrate.....	0.50%
Excipients.....	83.50%
*Equivalent to 4.0% technical sodium pentachlorophenate	

STA-BRITE is intended for use as a control of "Sap Stain and Mold" in freshly cut softwood and hardwood lumber, posts, poles, posts and timbers.

**DIRECTIONS**

**LUMBER.** For lumber 2 inches or less in thickness, dissolve 10 lbs. of STA-BRITE in 100 U. S. gallons of water. The freshly cut lumber should then be dipped or sprayed in this solution until complete surface wetting is accomplished.

**LOGS.** Spray the end and all surfaces areas of the freshly cut logs with a solution of 20 lbs. of STA-BRITE in 100 gallons of water.

**POLES, POSTS & TIMBERS.** Dissolve 20 lbs. of STA-BRITE in 100 gallons of water and dip or spray in solution until all surfaces are wetted.

It is desirable that the logs be bright and free from infection at the time they are converted into lumber. For best protection during warm weather lumber should be dipped the day it is sawed, or at least the following day. STA-BRITE should be thoroughly dissolved in a mixing tank of known capacity, such as a barrel, prior to being run into the dipping vat. The dipping vat should be protected from the rain to prevent dilution of the treating solution.

Treated lumber should not be exposed to heavy rains immediately after dipping. Lumber piles should be as narrow as practical, properly elevated, well spaced, and adequately roofed.

**- WARNING -**

**KEEP OUT OF THE REACH OF PETS, CHILDREN, OR IRRESPONSIBLE PERSONS**

Keep out of the reach of children and pets. Do not use in areas where children or pets are present. Do not use in areas where food is prepared or stored. Do not use in areas where food is consumed. Do not use in areas where food is stored. Do not use in areas where food is consumed. Do not use in areas where food is stored. Do not use in areas where food is consumed.

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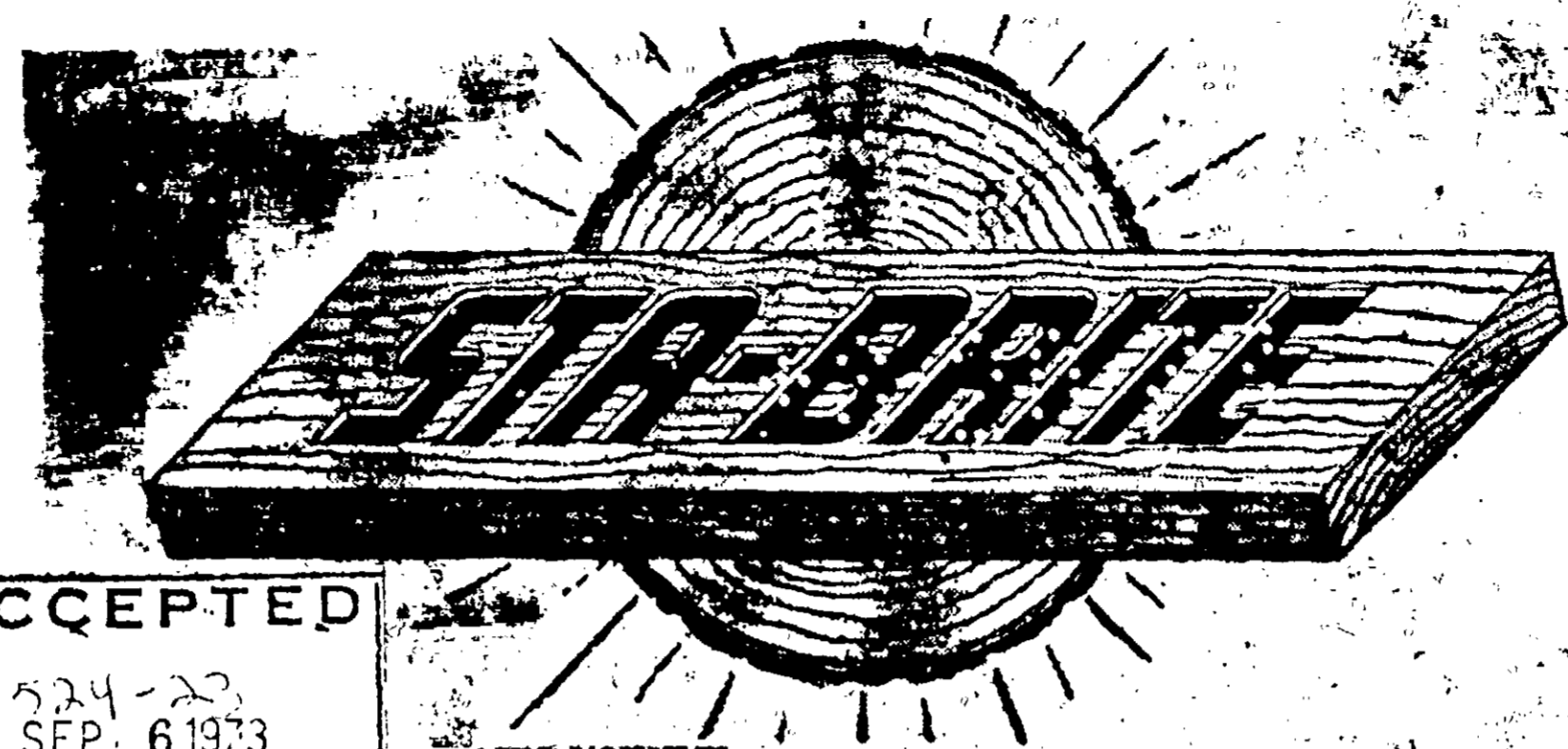
A Product of

**SUNFORD PRODUCTS CORPORATION**

SOUTHERN DIVISION  
P.O. BOX 5527  
MEMPHIS, MISSISSIPPI 38110

NORTHERN DIVISION  
P.O. BOX 100  
MINNEAPOLIS, MINNESOTA 55402

USDA Reg. No. 6651-1



ACCEPTED

524-23  
SEP. 6 1973

UNDER THE FEDERAL INSECTICIDE  
FUNGICIDE AND RODENT CHEMICAL ACT  
FOR ECONOMIC POISON REGISTERED  
ED UNDER NO. 43711 SUBJECT  
TO ATTACHED COMMENTS.

**ACTIVE INGREDIENTS:**  
Sodium pentachlorophenate.....32.0%  
Sodium Salts of other chlorinated phenols..... 4.4%  
Sodium tetraborate decahydrate.....58.0%  
**NET INGREDIENTS..... 5.6%**  
\*Equivalent to 40% technical sodium pentachlorophenate

STA-BRITE is intended for use as a control of "Sap Stain and Mold" in freshly cut softwood and hardwood lumber, logs, poles, posts and timbers.

**DIRECTIONS**

**LUMBER.** For lumber 2 inches or less in thickness, dissolve 10 lbs. of STA-BRITE in 100 U. S. gallons of water. The freshly cut lumber should then be dipped or sprayed in this solution until complete surface wetting is accomplished.

**LOGS.** Spray the ends and barkless areas of the freshly cut logs with a solution of 20 lbs. of STA-BRITE in 100 gallons of water.

**POLES, POSTS & TIMBERS.** Dissolve 20 lbs. of STA-BRITE in 100 gallons of water and dip or spray in solution until all surfaces are wetted.

It is desirable that the logs be bright and free from infection at the time they are converted into lumber. For best protection during warm weather lumber should be dipped the day it is sawed, or at least, the following day. STA-BRITE should be thoroughly dissolved in a mixing tank of known capacity, such as a barrel, prior to being run into the dipping vat. The dipping vat should be protected from the rain to prevent dilution of the treating solution.

Treated lumber should not be exposed to heavy rains immediately after dipping. Lumber piles should be as dry as practical, properly elevated, well spaced, and adequately roofed.

**- WARNING -**

**KEEP OUT OF THE REACH OF PETS, CHILDREN, OR IRRESPONSIBLE PERSONS**

Causes skin irritation. Harmful if swallowed. Do not breathe dust or spray mist. Do not get in eyes, on skin or clothing. Wash thoroughly with ample quantities of water after skin contact. Do not take internally. In case of swallowing induce vomiting by administering warm salt water or emetic. Do not contaminate feed or foodstuffs. Do not use on products that will be used in contact with food or feed.

This product is toxic to fish and wildlife. Keep out of lakes, streams or ponds. Do not contaminate water by cleaning of equipment, or disposal of wastes.

Do not reuse empty drum. Return to drum reconditioner or destroy by perforating or crushing and burying in a safe place.

BUYER ASSUMES ALL RISKS OF USE, STORAGE OR HANDLING IF THIS MATERIAL NOT IN STRICT ACCORDANCE WITH DIRECTIONS GIVEN HEREWITH.

A Product of

**SONFORD PRODUCTS CORPORATION**

SOUTHERN DIVISION  
P. O. BOX 5570  
JACKSON, MISSISSIPPI 39208

NORTHERN DIVISION  
RAND TOWER  
MINNEAPOLIS, MINNESOTA 55402

USDA Reg. No. 6651-1

**SANTOBRITE<sup>®</sup>**

**microorganism control  
in the pulp  
and paper industry**

TECHNICAL BULLETIN No. *Ø*/PS-2

*IC*

The information contained in this bulletin is to our best knowledge true and accurate, but all recommendations or suggestions are made without guarantee because their results or use are beyond our control. The Monsanto Company disclaims any liability incurred in connection with the use of these data or suggestions.

Furthermore, nothing contained herein shall be construed as a recommendation to use any product in conflict with existing patents covering any material herein.

Monsanto Company/Organic Chemical Division/800 N. Lindbergh Blvd./St. Louis, Mo. 63166

## Wet Processing and Microbiological Growth

Control of microorganism growth is of major importance to the pulp and paper industry.

Santobrite has the major advantage of not being activated in the presence of foreign organic matter (many other toxicants are).

### Advantages of Santobrite

Santobrite offers many advantages to the pulp and paper industry in controlling microbiological growth. It has a broad spectrum of activity—killing spore-forming and non-spore forming fungi.

Santobrite itself, is water soluble but can be deposited into finished paper products as insoluble pentachlorophenol (of equal fungicidal potency) by acidifying the processing solutions with acid or alum to a pH of 6.8 or below. This precipitates the insoluble acid in the stock and produces a mildew resistant paper or paperboard.

Santobrite is also highly effective for preservation of pulp stocks as well as other mill processing materials;

offering a low-cost economical treatment.

Santobrite is stable and offers no danger when used as directed.

## Microbiological Problems in the Pulp and Paper Industry

Paper manufacture provides a fertile environment for microbial growth. From grinder or wash pit to finished lap or sheet—the conditions of food supply, moisture, air tension, temperature, and light are ideal for stimulating the growth of bacteria, yeast and molds. These microorganisms cause numerous problems in mill operation and pulp processing.

Slime formation is the most serious of the biological problems that hamper successful mill operation. Slime usually is the result of bacterial growth. Bacteria produce growth products that entrap debris and form mats. Various fungi, yeasts, algae and still other bacteria will grow and proliferate inside this protective shield. Embedded organisms are quite difficult to reach and destroy; consequently, it is much easier to *prevent* slime formation than to control it once it has formed.

Slime formations occur most frequently in the white water system, anywhere between the grinder or wash pit and the finished lap or sheet. The slime adheres to the insides of pipelines, chests and screens; frequently it forms on the exposed spiders of cylinder machines and along the edge of the wire pit on Fourdrinier machines. Often slime can build up unnoticed until the first effects show up as breaks on the machine or as contaminated product.

## Slime Control

### GOOD HOUSEKEEPING

Good housekeeping practices (involving regular clean-ups) are most important for systematic control of microbial growth. However, these will not eliminate the problems completely, and it is necessary to employ supplemental chemical treatment.

Santobrite reduces overall costs by chemically inhibiting and killing microorganisms before they get out of hand; hence reducing frequency of costly periodic clean-ups.

This system should be free of slime when Santobrite treatment is begun. If it is not, a thorough mechanical cleaning to remove slime and inorganic debris is recommended.

### CONCENTRATION OF SANTOBRITE

Santobrite, the water soluble sodium salt of pentachlorophenol, is not consumed by the non-bacterial organic matter present in pulp and paper mill systems. It is usually effective in the range of 0.4 to 1.0 pounds per ton of product produced. The exact quantity needed will depend upon the particular mill conditions.

Barely inhibitory dosages of Santobrite are not recommended, because relatively resistant strains of microorganisms build up in a short time. If this happens, the organisms develop a tolerance to the treatment.

The use of an overdose of Santobrite is recommended once each week or ten days. Shock treatment at twice the regular amount discourages the acclimatization of slime-forming organisms. Usually, 40 p.p.m. is sufficient for periodic control; 80 p.p.m. for shock control. The amount of

Santobrite is determined by calculating the weight of water the system holds. For a 40 p.p.m. concentration, 40 pounds of Santobrite is added for each million pounds of water. Other concentrations are calculated similarly.

### POINT OF APPLICATION

Grinders, beaters and the machine white water receiver are all suitable locations for application. If the white water recovery is essentially complete, Santobrite may give complete slime control throughout the mill even if added at only one location. However, it is usually more effective and economical to introduce the Santobrite at each of the process points that show the greatest tendency to slime development.

### SOLUTION TECHNIQUES

Santobrite is <sup>AVAILABLE</sup> in several forms, <sup>ALL</sup> water soluble. A stock solution is recommended to charge the system. These rapid-to-distribute stock solutions are excellent for use in a standard chemical solution feeder.

Briquettes are recommended for direct application of Santobrite to the water system. They can be suspended in a muslin bag or suitable wire container. The desired rate of solution is controlled by the flow. A shower spray may also be utilized to solubilize briquettes.

The desired rate of addition will usually govern the choice between solution bleed or slowly dissolving briquette feed. To avoid foaming, local concentrations of Santobrite feed should not exceed 200 p.p.m.\*

\*The reader is referred to Monsanto Technical Bulletin 50-3 Analytical Methods for Pentachlorophenol and its Salts, for methods of determining Santobrite.

## Other Problems

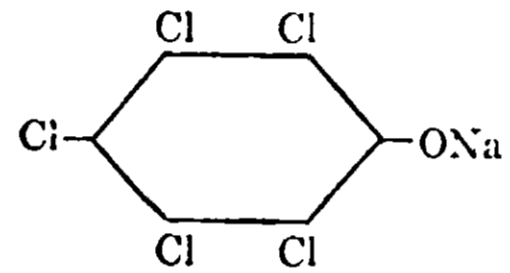
Santobrite can be used to control numerous other biological problems that arise in the manufacture of pulp and paper. The following table lists these problems and the Santobrite control method.

SANTOBRITE TREATMENT			
PROBLEM	CONCENTRATION	HOW TO APPLY	WHERE TO APPLY
Prevention of Stain and Rot on Pulp Logs	1.0-2.0% soln.	Dip or spray peeled or intact logs — cover ends	In the woods or when unloading at mill—within 24 hours of cutting.
Preservation of Stored Lap Pulp	0.5-2.0% soln. Apply 1-3 lbs. per ton dry fibre	Spray both sides of lap	During formation on the wet machine.
Prevention of Felt-rotting	0.5-1.0% soln.	Spray solution on felt and follow with mildly acidic spray.	When shutting down, apply solution directly to the felt.
Preservation of Stock and Surface Sizes During Shut-Downs	(Stock) 0.4-1.0 lbs. ton dry fibre (Size) 0.5-2.0% weight of dry size or coating.	Add to stock chests or other pulp storage vessels. Add powder directly to coating or sizing formulations.	
Manufacture of Mildew-resistant Board and Coated Paper	(Board) 0.5-1.0% weight of fibre	As powder at beater or as solution at calender box	To stock in beaters or wet sides of sheet at calender box with solution.
	(Paper) 0.5-2.0% dry weight of coating.	As powder	Add to coating material. Note: Beater addition is less effective than surface treatment.

MOVE UP

Yeast Control	75-100 p.p.m.	Solution feed or spray	Location of Activity
Protozoa Control	3-5 p.p.m.	Solution feed or spray	Location of Activity

## General Properties

Trade Name	Santobrite (Reg. U.S. Pat. Off.)	Odor	Characteristically chlorophenolic
Chemical Name	Sodium pentachlorophenate, technical		
Formula	$C_6Cl_5ONa$		
			
Molecular Weight	288.34	True Density	2.00 grams per cubic centimeter
Appearance	<i>light tan material available in several forms</i>	Stability	Stable under ordinary atmospheric conditions when stored in a dry place.
		Solubility	
			% Santobrite (On Weight of Solution)
		Water	
		At 4.0°C. (39.2°F.)	15.0%
		At 9.5°C. (49.0°F.)	20.0%
Assay	90% minimum. Calculated as sodium pentachlorophenate — determined from titration of hydroxyl group.	Solutions stronger than 20% tend to form crystalline precipitates which do not redissolve readily. Therefore, water-base formulations should be kept to 20% Santobrite or less to insure stability unless co-solvents (e.g., methanol) are used. Information on co-solvent techniques is available.	
Free Alkali	0.5-1.5% Calculated as NaOH		

### OTHER SOLVENTS

95% Ethyl Alcohol - 25°C.	32-33%
Acetone - 25°C.	32-33%
Benzene - 25°C.	0.1%

### pH

1% solution of pure sodium pentachlorophenate - about 9.0

1% solution of Santobrite - about 10.3

### OTHER CHARACTERISTICS

1. Converted to the insoluble phenol form at pH below 6.8.
2. Does not undergo decomposition when heated for extended periods of time at temperatures up to 300°C.
3. Its chlorine does not split off readily.
4. Relatively inert; does not react readily with organic compounds.
5. Decomposed slowly by ultraviolet light.
6. Forms insoluble chlorophenates when added to solutions of most metal salts.
7. Can be decomposed by most but not all strong oxidizing agents. With nitric acid, chloroanil, tetrachloro-paraquinone, and tetrachloro-ortho-quinone are formed and this reaction is the basis of a method for the colorimetric determination of sodium pentachlorophenate. (See Monsanto Technical Bulletin SC-8: "Analytical Methods for Pentachlorophenol and Its Salts.")
8. Dry Santobrite powder is non-corrosive to iron, steel, copper or brass.

### FDA REGULATIONS

Santobrite is regulated by the FDA for various applications in the manufacture of paper and paperboard products used in food packaging.

Approval for the use of Santobrite is described under the following FDA regulations:

Section 121.2001 -- Substances employed in the manufacture of food-packaging materials.

Granted under prior sanction as a slime control agent in the manufacture of paper and paperboard products used in food packaging.

Section 121.2505 -- Slimicides

Cleared as a substance permitted for use in the preparation of slimicides used in the manufacture of paper and paperboard products that contact food.

Section 121.2519 -- Defoaming agents used in the manufacture of paper and paperboard.

Cleared for use in defoaming agents used in the manufacture of paper and paperboard.

Section 121.2526 -- Components of paper and paperboard in contact with aqueous and fatty foods.

Cleared for use as a preservative for coating formulations for paper and paperboard for aqueous and fatty food use.

Section 121.2557 -- Defoaming agents used in coatings.

Cleared for use as a preservative in defoaming agents for paper and paperboard coatings.

Section 121.2571 -- Components of paper and paperboard in contact with dry foods.

Cleared for use as a preservative in coatings for paper and paperboard for dry food contact.



as set forth in this bulletin

## Health and Handling

Years of manufacturing and use experience with Santobrite have shown that it can be handled and applied. However, like most products harmful to microorganisms, Santobrite is harmful to humans if not properly handled.

Santobrite dust is irritating to the eyes, nose and throat, and may cause sneezing if inhaled. The solid material and water solutions one per cent or stronger irritate the skin on prolonged or repeated contact. Since solutions are absorbed through the skin, workers must not continue to wear clothing soaked by solutions. If Santobrite is swallowed, induce vomiting by giving mustard and water or other emetic and call a physician.

Goggles and an approved respirator will prevent irritation of mucous membranes from splashing or dust and prevent the sneezing or coughing that may result. Rubber gloves are recommended to prevent skin contact. In case of contact, wash the area with soap and water.

### TOXICITY TO FISH

The toxicity to fish is of interest when through their use pentachlorophenol or sodium pentachlorophenate can in some direct or indirect way get into fish-bearing streams or lakes. Dr. C. J. Goodnight (University of Illinois) conducted extensive research studies to evaluate the possible hazard to fish life arising from such pollution. His work was published.\* Following are quotations from the summary.

"Pentachlorophenol and sodium pentachlorophenate are fatal to the more sensitive species of fish in concentrations above 0.2 p.p.m. although hardier species will survive at 0.4 or 0.6 p.p.m. In lethal concentrations they increased the metabolism of fish as evidenced by respiratory movements; bleeding results from capillary rupture. Silver-mouthed minnows are the most sensitive of the fish used in the experiments.

"The toxicity of pentachlorophenol and sodium pentachlorophenate to fish is increased by lowering the pH of the water. Within reasonable limits the size of the fish, the temperature of the water, and its character do not greatly affect the toxicity of the compounds. The number of fish in a solution of given volume does not affect their survival time. Above 10 p.p.m. fish can detect the presence of sodium pentachlorophenate but not below 5.0 p.p.m.

"Eggs of lake trout are very resistant to these compounds. Lake trout are most sensitive to pentachlorophenol in the yolk sac stage immediately after hatching.

"Invertebrates such as are used by fish as food are relatively insensitive to pentachlorophenol and sodium pentachlorophenate. The most sensitive invertebrates will live at concentrations at which fish will survive."

\*Goodnight, C. J., Toxicity of sodium pentachlorophenate and pentachlorophenol to fish. Ind. Eng. Chem. 34, 808 (1942)