



## INDUSTRIAL TECHNOLOGIES PROGRAM

# Reducing Voc Press Emissions From Oriented Strand Board (Osb) Manufacturing

## VOC Emissions During Manufacture of Composite Board

Implementation of the Clean Air Act Amendments of 1990 is underway and the industry needs better emissions data and cost-effective methods to control regulated compounds. During the manufacture of lumber and composite board by the pulp and paper industry, the solid wood or wood flakes and fibers are dried and pressed at high temperatures. This sets up the right conditions for the release of various particulates and gases, including nitrous oxides, sulfur oxides, carbon monoxide, volatile organic compounds (VOCs), other hazardous air pollutants (HAPs) and toxic chemicals, and odors.

Once in the atmosphere, the VOCs, in particular, contribute to ground-level ozone formation and become an environmental issue in states east of the Mississippi River where 60 percent of the particle board is manufactured. Twenty percent of VOCs emitted into the air annually originate in particle board presses and 50 percent are generated by dryers. Modification of the entire pressing and drying process is needed to minimize air pollutants and eliminate the need for end-of-pipe controls. Removal of potential emissions from the final product will also benefit the public that uses them.



Initial Background studies on Air Emissions from an OSB Plant in Michigan.



### Benefits for Our Industry and Our Nation

- Reduced indoor air emissions for end-users in buildings where particle board and other wood products are used
- Reduced ground-level ozone formation
- Fundamental knowledge on the rate and volume of VOCs released from press vents under varying conditions
- Lowered production costs
- Increased industrial competitiveness

### Applications in Our Nation's Industry

The mill trials during the third year of the project will be full-scale, commercial trials in cooperation with the oriented strand board industry and in compliance with its regulations. A new processing method will reduce or minimize industrial air emissions and allow industry to meet present environmental standards.

## Project Description

**Goal:** To develop a new manufacturing process to reduce VOCs and HAPs from the press vents at the end of the production of oriented strand board.

The project's tasks included determining which chemical additives minimize the formation of VOCs and HAPs and whether they affect board properties; determining the effect of resin systems on VOC and HAP formation in the presence of chemical additives; modifying the surface of the wood furnish with chemicals to enhance absorption of VOCs and/or HAPs to reduce their emission into the air; and determining the chemicals that react specifically with VOCs and HAPs and whether they affect board properties.

## Results

- Initial results indicated that the most promising results could be obtained by using chemical additives to treat the VOCs in the air stream, after they were formed or released from the wood. Addition of chemical additives directly in the wood was not as effective in reducing the level of VOCs and had a detrimental effect on the final product quality.
- The chemical additives initially used for this study were a series of acids, bases, oxidizing agents and nucleophiles. The chemical additives that were found to be most effective included aluminum sulfate, ferric chloride anhydrous, hydroxylamine hydrochloride, iron, maleic anhydride, sodium hydroxide and urea.
- Of the seven additives tested, ferric chloride exhibited the greatest reduction for methanol, acetone, acetic acid, hexanal, and limonene. Hydroxylamine hydrochloride exhibited the greatest reduction for a-pinene, b-pinene, and 3-carene. Elemental iron was also an effective treatment for VOC/HAPs. All of the additives were effective in reducing one or more of the major contaminants produced from heating the wood.

## Project Partners

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## A Strong Energy Portfolio for a Strong America

Energy efficiency and clean, renewable energy will mean a stronger economy, a cleaner environment, and greater energy independence for America. Working with a wide array of state, community, industry, and university partners, the U.S. Department of Energy's Office of Energy Efficiency and Renewable Energy invests in a diverse portfolio of energy technologies.



**U.S. Department of Energy**  
**Energy Efficiency**  
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Bringing you a prosperous future where energy  
is clean, abundant, reliable, and affordable

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