

Application Report

AR-147

BMCA Insulation Products, Inc. retrofits dryer with Eclipse Minnox Burners; greatly exceeds stringent California air quality mandates.

BMCA Insulation Products, Inc., a subsidiary of GAF Materials Corporation, manufactures Permalite® brand perlite roof insulation products at its plant in Ontario, California. Permalite roof insulation is a homogenous board composed of expanded perlite particles, selected binders and cellulose fibers which impart its integral insulating properties.

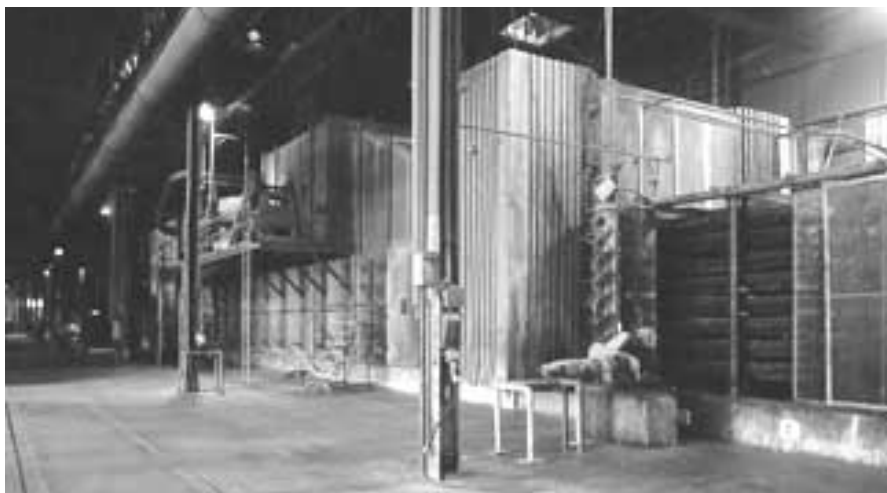
Perlite is a type of volcanic rock that expands when heated. The ore initially looks like finely ground sand. But, when exposed to high heat, it pops—like popcorn—to 10 to 15 times its original volume and forms small, white insulating beads.

constitutes the basic material for manufacturing perlite insulation board. The process is similar to making paper. The exception being thickness. Perlite “paper” is produced in thicknesses from 1/2 to 1-1/4 inches.

The 95% water slurry is passed from a blending tank onto an eight foot wide, wire screen board forming machine that terminates in a press section. As it approaches the press, water is drained off over a series of vacuum boxes to form a mat. The mat, which is composed of 75% water at this stage, is cut into specific lengths by a guillotine type cutter prior to entering a gas-fired 3-zone, 8-level dryer.

In this 400 foot long oven, 8.5 foot lengths of wet perlite board are dried by circulating hot air at approximately 400° to 600° F to evaporate the remaining moisture. Depending on thickness, it takes from one to two hours for a board to pass through the dryer . . . and, then, on to trimming, sizing and packing operations.

Although a lot of thermal energy is expended in the manufacturing process at BMCA's Ontario plant, perlite insulation board pays for the energy costs many times over in fuel savings for the owners of buildings it insulates. NOx and CO emissions emanating from the drying operation, however, is another matter, and one the company takes very seriously.

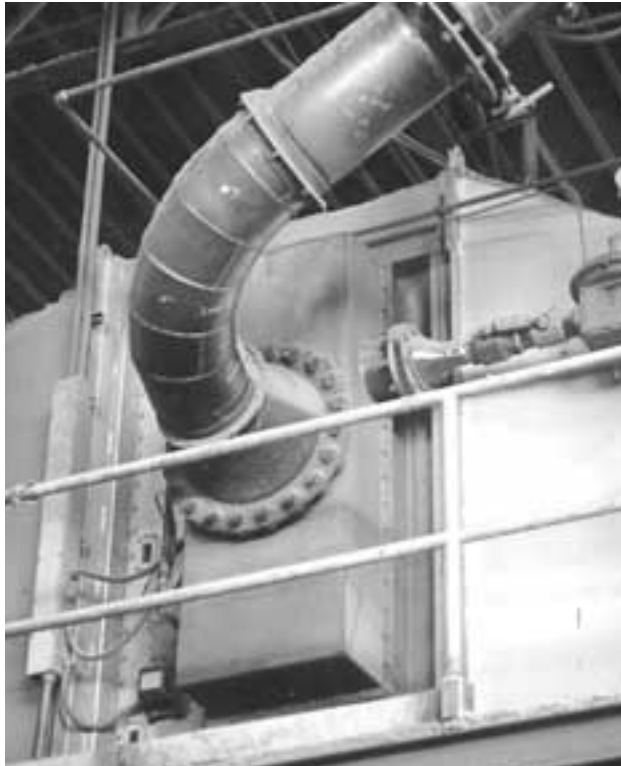


A 400' long, 3-zone oven dries wet perlite board by circulating hot air at approximately 400° to 600° F.

The expanded volcanic material will not burn and, when combined with repulped newsprint and certain chemical additives in a water slurry,

The Problem

Ontario, California is located within the South Coast Air Quality Management District (SCAQMD), the smog control agency for all portions of Los Angeles, Orange, Riverside and San Bernardino Counties, California, where 14 million people—about half the state's population—breathe the dirtiest air in the U.S. It is the second most populous urban area in the country.



Six Minnox direct fired air-heating burners were retrofitted in the drying oven to significantly reduce NOx and CO emissions.

Many of the same factors that make living in Southern California so desirable also contribute to the worst smog problem in the nation. Gentle ocean breezes carry pollutants into the inland valleys where they are trapped by surrounding mountains. Thermal inversions act like a lid over the basin. Bright sunshine and warm temperatures cause some pollutants to react with each other, forming even more pollution. These natural conditions, along with the pollution from over 9 million motor vehicles, thousands of businesses, and countless consumer products, create an ideal smog factory.

Different types and levels of air pollution can cause everything from watery eyes and fatigue to respiratory disease, lung damage—even cancer. Because this area's smog problem is so severe, AQMD often finds itself at the forefront of the nation's effort to reduce air pollution.

AQMD is responsible for controlling emissions from stationary sources of air pollution—as opposed to mobile sources such as airplanes, cars, trucks, buses, etc. These can include anything from large powerplants and refineries to the local gas station. They also include industries such as BMCA's insulation plant.

The BMCA Challenge

"At BMCA we take the AQMD compliance requirements very seriously," says Plant Engineer, Paul Davila. Our business has always been environmentally friendly within the limits of existing technology. Our super-efficient perlite roof insulation board has conserved vast amounts of energy over the years—at great cost savings—for the owners of commercial buildings, our primary customers. We also repulp huge quantities of waste newsprint, a main ingredient in our board composition. We were doing so long before recycling became ecologically fashionable.

So, when SCAQMD contacted us about lowering the emissions from our drying oven, we were eager to participate in the program. In fact, we made 'Super Compliance' our ultimate goal. The question, of course was how to go about it."

AQMD's emissions trading program allows many facilities—including BMCA—the flexibility to choose the most cost effective way of achieving annual reductions in air pollution.

"Under the SCAQMD RECLAIM program, companies which are able to reduce emission levels more than required—in other words, are 'super compliant'—can obtain emission

credits they can sell on the open market to other RECLAIM facilities," says Sam Atwood of the AQMD News Bureau. According to Atwood, NOx emissions requirements are established annually and will be lowered incrementally each year until they are fixed at a permanent level in 2003.

AQMD staff conducts periodic inspections to ensure continued compliance with requirements. When necessary, strict enforcement action is taken—including up to \$50,000 per day and/or a day in jail for each day of violation—to bring balking businesses into compliance with the rules.

According to Davila, the AQMD challenge came at a time when the Maxon ED6 and ED7 velocity burners used in the drying oven were scheduled for replacement. "Needless to say, these vintage burners with long uncontrolled flames didn't come close to meeting today's emissions requirement. The search for replacement burners was on."

Eventually Davila contacted BMCA's corporate office in New Jersey for advice. They referred him to Eclipse Combustion, Inc. in Rockford, Illinois who, in turn, suggested he contact Wirth Gas Equipment, Inc. in Glendale, California. Wirth Gas has represented Eclipse in southern California, southern Nevada and, more recently, Arizona, since 1954.

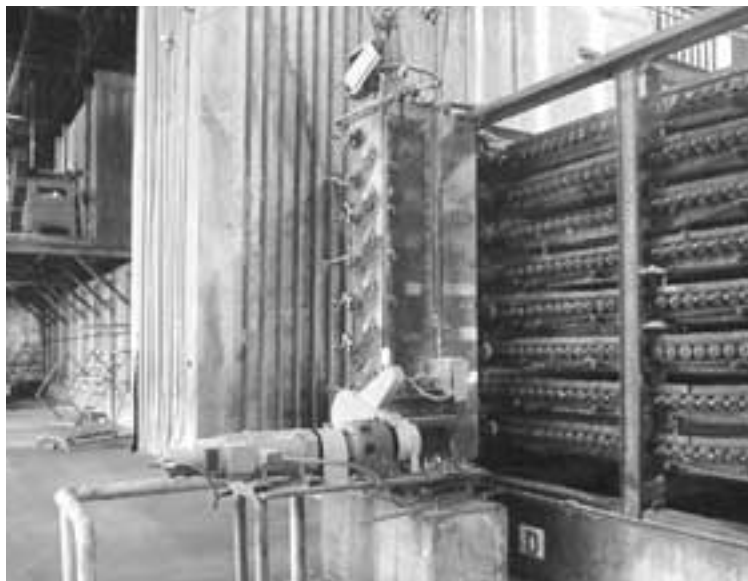
Although BMCA had no prior experience with Eclipse equipment, Eclipse products were being used in IR paper drying and other applications at various GAF plants around the country. Says Wirth Gas sales associate Jeff Dorfner, "We were contacted late in the procurement process. BMCA had already received bids from two major competitors. In fact, we were the required third bid, if you will, but that's OK. We were ready to meet the challenge. I knew going in that our new Eclipse Minnox burner was 'made' for this low temperature, emissions sensitive application."

The Minnox Solution

BMCA agreed...following an after-installation guarantee from Eclipse of 9 ppm. NOx @ 3% O₂. The insulation company ordered six Minnox direct fired air heating burners (two each of 16.0, 20.0 and 12.0 MMBTU/HR) to be retrofitted in the drying oven after a new firewall was installed. Referring to the ppm guarantee, says Dorfner, "We wouldn't have made it if we weren't highly confident in Minnox's capability based on many previous installations.

The patented Minnox burner design utilizes a premixed gas/air mixture with excess air. This cutting edge technology results in a cooler flame temperature (2000° F, 1200° C) and produces extremely low NOx discharge from the burner head. In addition, the burner's unique configuration creates a recirculating flame geometry, which acts to significantly reduce CO emissions... all without sacrificing performance.

Prior to the introduction of Minnox, achieving acceptable product quality often required the use of less efficient



Cut-to-length wet perlite boards are loaded onto an 8-level conveyor prior to passing through the dryer.

indirect heating. And with conventional direct-fired systems, great care had to be taken with many products to avoid discoloration or taste contamination.

By minimizing the amount of emissions emanating from the heat source, Minnox burners effectively control product discoloration, a major concern at BMCA as well as in food processing and painting applications.

What's more, with the Minnox direct heating system there is no performance penalty. The direct-fired burners use less energy than indirect-fired burners. Says Paul Davila who was in charge of the burner selection project at BMCA, "The burners perform very well in our 3-zone drying oven which operates at a fixed rate depending on board thickness. We're experiencing a fuel savings and production increase. We have also realized more uniform heating—resulting in less downtime—and better dryer control. Morale has even improved with the reduction in headaches and stress. But, for us, the really excellent outcome is in the area of emissions... which is what drove the project in the first place."

The Result

To demonstrate compliance with SCAQMD Rule 2012, Super Compliance guidelines, the agency hired an independent firm, Pacific Environmental Services (PES), Inc., Baldwin Park, California, to conduct a source test. According to the PES report, the oven was tested at three different operating conditions...while producing 1/2-inch, 3/4-inch and 1-inch insulation board.

Each source test was conducted using continuous analyzers to monitor the combustion gases by SCAQMD methods in all three oven zones, simultaneously. The Eclipse guarantee of 9 ppm NOx was easily achieved—and significantly bettered—at BMCA. In all three tests NOx concentration levels never exceeded 3.8 ppm (3/4-inch board) @ 3% O₂ and ranged as low as .42 (1-inch board). What's more, BMCA expects to achieve AQMD Super Compliance status as well as the year 2003 fixed emissions levels by 1999.

The Minnox direct-fired air heating burner is guaranteed by Eclipse to emit less than 20 ppm NOx and less than 50 ppm CO, corrected to 3% O₂. It is the lowest emissions burner of its kind in the world today and was awarded the prestigious DSM (Dutch) Environmental Technology Award for its role in solving major global environmental problems such as acid rain and the greenhouse effect.

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