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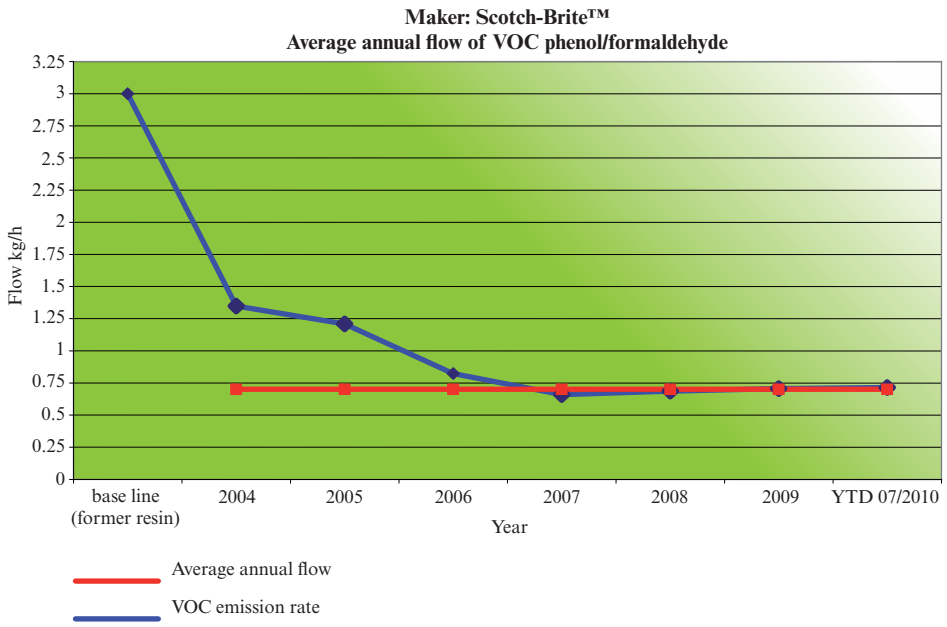
# No. 128 Pollution Prevention Case Studies

## VOC Reduction Through Raw Materials Substitution

| | |
|---|---|
| **Company** | 3M France, Beauchamp site (France) |
| **Industrial sector** | Manufacture of man-made fibres<br>ISIC Rev. 4 no. 2030 (International Standard Industrial Classification of All Economic Activities) |
| **Environmental considerations** | 3M introduced the Pollution Prevention Pays (known as 3P) initiative in 1975. 3P prevents pollution at the source, in products and manufacturing. To date, 3P has resulted in the elimination of more than 3 billion pounds of pollution and saved nearly $1.4 billion.<br><br>3P is based on the belief that a preventive approach is more effective technically and economically than conventional pollution controls. Implementing conventional controls requires natural resources, human energy, and investments both during construction and operation. In addition, conventional controls only constrain the problem temporarily, without elimination. |
| **Background** | 3P is innovative, because it reduces consumption of resources by preventing pollution up front– through product reformulation, process modification, equipment redesign, and recycling and reuse of waste materials.<br><br>Every 3P solution has come from what you might call the "fourth P"– the people. The programe relies on the voluntary participation of the employees around the globe. To date, they have completed more than 8,100 projects. |
| **Summary of actions** | The site produces several types of Scotch-Brite™ scrub sponges. The Scotch-Brite™ product line has always been made with phenolic resin and organic solvents, as there were no other raw materials available on the market. To comply with the EEC regulation, the company had two options: invest in pollution-control equipment (thermal oxidizer) or reformulate to reduce the emission of specific volatile organic compounds (phenol and formaldehyde) and eliminate the use of organic solvents.<br><br>3M initiated a partnership with its supplier to develop a low-emission resin. The Beauchamp laboratory, the manufacturing team and the supplier team reformulated the whole Scotch-Brite™ line. The breakthrough has been made through the qualification of a new resin with a specific additive and the implementation of raw materials that can be processed with water. In the meantime, 3M has totally removed the ethyl glycol, isopropanol and ethyl glycol acetate.<br><br>The 3M team took into account the following criteria for the Scotch-Brite™ line reformulation:<br>• All new product recipes<br>  • Oven temperatures<br>  • 100% solvent-free recipes, including dye<br>  • Lower emissions and higher water tolerance of the resin<br>  • Use of a scavenger to reduce phenol and formaldehyde emission<br><br>3M implemented the Six Sigma methodology to develop this action. |

## Diagram




## Balance

| | OLD PROCESS | NEW PROCESS |
|---|---|---|
| **VOC emissions** | 3 kg/h P+F*<br>5.5 kg/h solvent | 0.7kg/h P+F*<br>0 kg/h solvent |
| **Investment** | 0 | |
| **Annual cost savings** | Cost avoidance: 1M euro + operating costs (natural gas consumption reduction) | |

*(*) Phenol + Formaldehyde*

## Conclusions

The implementation of this action has achieved a 23.3% reduction of phenol and formaldehyde, and a 100% reduction of solvent. Achievement of that goal, with no cost, was possible through strong collaboration from 3M and the suppliers' team during research.

In the meantime, 3M's goal is to continue to apply the product & process understanding methodology to produce "Right the First Time" and optimise raw material consumption and consequently the reduction of emissions and waste.

**NOTE: This case study seeks only to illustrate a pollution prevention example and should not be taken as a general recommendation.**

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