



## Project Summary

# Evaluation of Barriers to the Use of Radiation Cured Coatings in Wide-web Flexographic Printing

Jill B. Vitas, C. Jeff Harris, and William L. Blake, Jr.

**In support of the Source Reduction Review Project (SRRP), maximum achievable control technology (MACT) standards development, and the Pollution Prevention Act of 1990 (PPA), the U.S. Environmental Protection Agency's (EPA's) Air Pollution Prevention and Control Division (APPCD) is investigating the current industrial use and barriers to the extended use of radiation-cured coatings in SRRP and MACT categories. This report presents the results of a study to investigate and identify the technical, economic, and educational barriers to the use and implementation of radiation-curable coatings (primarily ultraviolet (UV) curable inks) in the wide-web flexographic printing industry. Some important barriers identified are: the damage to thin film substrates and expansion of press components caused by the heat generated by UV lamps, foaming caused by the higher-viscosity UV-curable flexographic inks, the industry perception that UV systems are not cost-effective, and the misperception that a substrate with UV-cured ink is less chemically resistant.**

***This Project Summary was developed by EPA's Air Pollution Prevention and Control Division of the National Risk Management Research Laboratory, Research Triangle Park, NC, to announce key findings of the research project that is fully documented in a separate report of the same title (see Project Report ordering information at back).***

Section 4(b) of the PPA requires EPA to "review regulations of the Agency prior

and subsequent to their proposal to determine their effect on source reduction." In support of the PPA, EPA established the SRRP to focus this review on pending regulations (and anticipated regulated industries) under the Clean Air Act Amendments of 1990 (CAAA), the Clean Water Act (CWA), or the Resource Conservation and Recovery Act (RCRA). A goal of the SRRP tasks is to ensure that source reduction and multimedia issues are considered during the development of upcoming air, water, and hazardous waste standards.

An important set of regulations under the CAAA, and a focus of SRRP, are the standards for MACT to reduce emissions of hazardous air pollutants (HAPs). Promulgation of these regulations began in 1992 and will continue throughout the decade and into the next century. The MACT standards offer EPA an excellent opportunity to use SRRP to incorporate pollution prevention measures into the upcoming standards for specific source categories. Pollution prevention efforts may offer economic, health, and ecological benefits to many sectors of society that are not available through traditional pollution control methods.

In support of the SRRP Program, MACT standards development, and the PPA, EPA's APPCD of the Office of Research and Development's (ORD's) National Risk Management Research Laboratory (NRMRL) is investigating pollution prevention opportunities for product and material substitutions that help industry to reduce waste. The specific objective of this project was to investigate the current industrial use and barriers to the extended use of

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radiation-cured coatings in SRRP and MACT categories. Wide-web flexographic printing (a part of the Standard Industrial Classification (SIC) 2759, Commercial Printing, Not Elsewhere Classified), an industry facing upcoming MACT standards, was selected as an industrial segment for study. When the MACT standards are developed, EPA will have a better understanding of which coating technologies are feasible pollution prevention alternatives for the industry.

The report gives results of a study to investigate and identify the technical, educational, and economic barriers to the use and implementation of radiation-cured coatings in wide-web flexographic printing. The project involved preparing category analyses, identifying and classifying the use and implementation barriers, evaluating and assessing the environmental impacts, and identifying pollution prevention and source reduction research opportunities in the flexographic printing industry. In addition to conducting literature searches, contacts were made with industry and pollution prevention experts in the Flexographic Technical Association (FTA), RadTech International, the Flexible Packaging Association (FPA), and equipment and ink manufacturing firms.

In addition, information was compiled during several site visits. Copies of the site visit reports are included in Appendices A through D of the report. Together, these information-gathering efforts provided the background needed to identify the barriers and source reduction research

opportunities in the wide-web flexographic printing industry. To further identify and develop research opportunities that can be conducted by EPA, a focus group meeting was held in Durham, NC, on June 29, 1995. Representatives from equipment manufacturers, ink manufacturers, converters, trade associations, and EPA attended the meeting.

Initial work into the UV-cured wide-web flexographic printing industry indicated that U.S. companies were very proprietary about their use of UV technology and were generally unwilling to share information on their progress, for fear of losing a competitive advantage. After contacting several press manufacturers, a German manufacturer of UV-cured wide-web flexographic printing presses agreed to allow a site visit. Moreover, the press manufacturer also arranged a visit to a printer using the UV-cured presses in full commercial operation.

The site visits provided most of the information contained in this report. Consultation with the German firms demonstrated that UV-cured wide-web flexographic printing is a commercially viable process. Existing technical barriers, primarily in the areas of press temperature control and ink delivery, have generally been overcome. The remaining barriers are primarily perceived economic barriers and some product quality issues in specific applications.

The report divides the barriers to implementing UV-curable inks and coatings into three categories: technical, economic, and

educational barriers. Separate chapters examine the three barrier categories.

This document suggests projects for EPA that could help overcome technical, educational, and economic barriers identified. Some of the opportunities discussed include the following:

- Investigation of methods to segment the industry to better address pollution prevention/control technology options for specific segments of the industry. Segmentation options could include categorizing by end products, substrates, or processes.
- Investigation of migration and potential toxicity for all types of inks. Industry also suggested that EPA assist in the transfer of existing information on migration to the printers.
- Investigation of substrates which could lead to more effective and economical use of currently available alternative inks.
- The industry also discussed the apparent need for a success story (e.g., a printing facility that has converted to UV-curable inks and has improved product quality and/or reduced costs). EPA could address this issue in two ways: (1) assist in a demonstration by providing funding, protocol development, testing capabilities, and risk assessments; and (2) provide technology transfer.

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*Jill B. Vitas, C. Jeff Harris, and William L. Blake, Jr., are with TRC Environmental Corp., Chapel Hill, NC 27514.*

**Carlos M. Nunez** is the EPA Project Officer (see below).

The complete report, entitled "Evaluation of Barriers to the Use of Radiation Cured Coatings in Wide-web Flexographic Printing," (Order No. PB98-106412 Cost:

\$31.00, subject to change) will be available only from

National Technical Information Service

5285 Port Royal Road

Springfield, VA 22161

Telephone: 703-487-4650

The EPA Project Officer can be contacted at

Air Pollution Prevention and Control Division

National Risk Management Research Laboratory

U.S. Environmental Protection Agency

Research Triangle Park, NC 27711

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