



Toxics Use Reduction Case Study

Elimination of TURA Reportable Chemical at Hampden Papers

Summary

In an ongoing effort to limit emissions and reduce use of hazardous chemicals, Hampden Papers, Inc. of Holyoke, MA spent four years researching, developing, testing and implementing a new coatings formulation used in over 70% of the company's manufacturing capabilities.

The new formulation helps Hampden Papers reduce annual VOC emissions by 4-6 tons. More significantly, the change eliminates the use of ethylene glycol monobutyl ether and thereby frees the company from filing requirements under both the Massachusetts Toxics Use Reduction Act (TURA) and Superfund Amendments and Reauthorization Act (SARA) Section 313¹.

Background

Hampden Papers, Inc. manufactures decorative and functional paper, paperboard, aluminum foil and plastic films for use in packaging and graphic arts in over 80 markets. The 120-year-old company, headquartered at a 300,000 sq-ft facility in Holyoke, MA, has a long history of toxics use reduction planning and implementation² dating back to the 1970's. The company has achieved significant reductions in wastewater discharges and air emissions from its various coatings operations over the last two decades despite a corresponding increase in total units of production.

Over 70% of the company's manufacturing capabilities involve the manufacture and application via direct gravure of inks and other coatings to paper and aluminum foil. These substrates range in width from 26" to 61" and run on six manufacturing units at speeds of 200 – 1000 feet per minute. Prior to toxics use reduction, this process utilized an acrylic emulsion and solution coating technology. The coating formulation (specified as #412) contained ethylene glycol monobutyl ether, a reportable chemical under the Toxics Use Reduction Act (TURA) and Superfund Amendments and Reauthorization Act (SARA) Section 313.

Toxics Use Reduction

Previous coatings reformulation efforts undertaken by Hampden Papers helped significantly reduce the company's VOC emissions and zinc levels in wastewater discharge. In the mid-1990's, technical staff at

¹ Also known as the "Toxic Chemical Release Inventory report (TRI)."

² Other OTA case studies profiling Hampden Papers: *Hampden Papers Reduces Wastewater By 88%; VOC Reduction at Hampden Papers*; and *Reformulated Coating at Hampden Papers Reduces Metals in Sewage Sludge*

Hampden Papers began researching options for reducing VOC emissions still further, as well as eliminating use of the company's last TURA/SARA 313 chemical, ethylene glycol monobutyl ether.

Over the course of four years of researching and testing, Hampden Papers and its supplier managed to develop a new single-component acrylic polymer (#729) that met – and even exceeded – the company's environmental and performance specifications. The new system, which fully replaces the old #412 system, uses dipropylene glycol methyl ether in place of ethylene glycol monobutyl ether as a coalescent. No metallic crosslinker is required (thereby eliminating zinc oxide use) and overall VOC content is greatly reduced. In terms of performance, #729 successfully overcomes a number of hurdles, including the need to achieve sufficient dry coating gloss, surface tension and adhesion of the coating to the substrate, as well as odor concerns and spread defects encountered during early machine trials. Subsequent testing with the final formulation indicated that no changes to the mixing and application process would be required.

Hampden Papers began integrating #729 into its operations at the beginning of 1999, and was able to completely switch over by August of that year. Because the company is required under its air permit to conduct daily recording of emissions, quantifiable data on the formulation's air quality impact was readily available.

Results

Emissions:

Based on daily monitoring data and current production levels (as of 2000) Hampden Papers estimates that its new coatings formulation will help reduce total VOC emissions from 12-14 tons per year (tpy) to roughly 8 tpy. Compared to the previous coatings system, #729 represents a 65% decrease in pounds of VOC per gallon of solids applied.

Toxics use:

In addition to eliminating ethylene glycol monobutyl ether and roughly 5 tpy of zinc oxide (at 12%), the new system also reduces Hampden Paper's use of isopropyl alcohol by roughly 2 tpy and ammonium hydroxide (at 28%) by roughly 4 tpy.

The dipropylene glycol methyl ether used in the new coating system is considered to be less toxic and less combustible than ethylene glycol monobutyl ether (which is poisonous by ingestion or skin contact and moderately toxic by inhalation).

Compliance:

The elimination of ethylene glycol monobutyl ether frees Hampden Papers from TURA and SARA 313 reporting requirements.

Cost:

The cost of the new system is on average \$0.05 more per pound than the previous system, amounting to a cost increase of roughly \$8725 per year. However, this expense is partially offset by savings of over \$5,725 in avoided annual reporting costs. Hampden Papers also calculates some benefit from the superior performance of the new system and improvements to working conditions due to VOC reduction.

This case study is one in a series prepared by the Office of Technical Assistance (OTA), a branch of the Massachusetts Executive Office of Environmental Affairs. OTA's mission is to assist Massachusetts facilities with reducing their use of toxic chemicals and/or the generation of toxic manufacturing byproducts. Mention of any particular equipment or proprietary technology does not represent an endorsement of these products by the Commonwealth of Massachusetts. This information is available in alternate formats upon request. OTA's **nonregulatory** services are available at **no charge** to Massachusetts businesses and institutions that use toxics. For further information about this or other case studies, or about OTA's technical assistance services, contact:

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