

I. INTRODUCTION AND BACKGROUND

Volatile Organic Compound (VOC) emissions from solvent cleaning operations contribute significantly to the South Coast Air Basin's emission inventory. The South Coast Air Quality Management District (SCAQMD or District) periodically adopts an Air Quality Management Plan (AQMP). This AQMP calls for significant reductions in VOC emissions from cleaning and degreasing operations by 2010 to achieve attainment status.

The SCAQMD regulates VOC emissions from businesses located in the four county area including Los Angeles County, Orange County, San Bernardino County and Riverside County. One of the District's rules that focuses on cleaning applications is Rule 1171 "Solvent Cleaning Operations." One of the categories of cleaning regulated in Rule 1171 is cleaning of coating and adhesive application equipment. On July 1, 2005, the VOC limit for this type of cleaning was reduced from 550 grams per liter VOC to 25 grams per liter VOC. This is one of the VOC limits adopted by the District to reduce VOC emissions from cleaning operations in the Basin.

The Institute for Research and Technical Assistance (IRTA) is a nonprofit organization established in 1989. IRTA works with companies to test and demonstrate alternatives to ozone depleting, VOC and toxic solvents. IRTA also conducts projects that focus on finding low-VOC, low toxicity alternatives for whole industries. IRTA runs and operates the Pollution Prevention Center, a loose affiliation of local, state and federal governmental organizations and a large electric utility company.

The District contacted with IRTA to identify, test and demonstrate low-VOC alternative materials for cleaning coating and adhesive application equipment. IRTA completed that project in 2003 and reported the results in a document entitled "Assessment, Development and Demonstration of Low-VOC Cleaning Systems for South Coast Air Quality Management District Rule 1171." The work on cleanup of coating and adhesive application equipment in that project focused only on traditional coatings and did not address cleanup of ultraviolet (UV) or electron beam (EB) cured coatings or adhesives. The District contracted with IRTA to conduct a separate project to identify, test and demonstrate low-VOC materials for specifically cleaning UV and EB curable coating and adhesive application equipment.

Tests of Alternative Low-VOC Cleaners

Performance of the alternative cleaning agents at each facility was evaluated on a case-by-case basis. In each instance, plant personnel provided information on their requirements for the cleaning process. In some cases, IRTA obtained a sample of the coating or adhesive that required cleaning. IRTA conducted laboratory testing to screen cleaners that might be appropriate for testing in the operation. IRTA then provided or took to the facility cleaners that might be effective and they were tested. In terms of performance, a cleaning alternative was judged as successful if it cleaned as well as or

better than the cleaning process the company uses currently. When there were differences in the cleaning process, these were noted.

The alternative low-VOC materials that were used by or tested in the participating facilities included not cleaning at all, plain water, water-based cleaners, methyl acetate and acetone. Acetone and methyl acetate are exempt from VOC regulations and the water-based cleaners that were tested have a VOC content of 25 grams per liter or less. The UV or EB curable coatings or adhesives that require removal from the application equipment were not cured so cleaning could be performed effectively with these techniques and materials.

Cost Analysis

IRTA performed cost analysis and comparison for the alternatives that were successful at the participating facilities. There were no capital equipment costs for the facilities and none of the facilities indicated there would be different labor costs with use of the alternatives. The cost analysis and comparison was generally based on the cleaner cost and the cleaning material costs. No cost comparison was performed for one of the facilities because there were no records of the cost of cleaning.

Report Structure

This document reports the results of a project to find alternative low-VOC cleanup materials for UV and EB curable coatings and adhesives. During the project, IRTA worked with four facilities that used UV or EB curable coatings or adhesives. Section II of this document presents the work that was performed on alternatives for each of the facilities participating in the project. In each case, it describes the process used by the facility, discusses what material is used for cleanup of the application equipment currently, presents the results of the alternative low-VOC material testing and analyzes and/or compares the cost of using the high and low-VOC cleanup materials. Section III of the document summarizes the conclusions and results of the project.