

Safer Alternatives to Floor Wax Strippers

April 12, 2016



Katy Wolf, Ph.D.
Institute for Research and
Technical Assistance

Institute for Research and Technical Assistance

- ◉ Small nonprofit technical organization established in 1989
- ◉ Identifies, develops, tests and demonstrates safer alternatives in consumer product and industrial applications
- ◉ Projects have led to reduction in use of hazardous substances in California by more than 100 tons per day

Background on Floor Wax Strippers

- ◉ Schools and public buildings commonly use Vinyl Composition Tile (VCT) flooring in hallways, classrooms, offices and public spaces
- ◉ VCT requires waxing to maintain its glossy or shiny appearance
- ◉ Floor finishes applied regularly
- ◉ Floor wax strippers are used routinely to strip floor finishes

Background Cont'd

- ◎ CARB regulates air emissions from consumer products including wax strippers in California
 - > Limits on VOCs which cause smog (8 tons/day)
- ◎ Many floor wax strippers used today pose health and environmental problems
 - > Many have high VOC content
 - > Many contain toxic solvents
 - > Most contain monoethanolamine which can cause asthma and is a sensitizer
 - > Some contain other amines which can form nitrosamines which are carcinogens
 - > Many have high pH
- ◎ Alternative low-VOC, low toxicity strippers need to be developed, tested and demonstrated

IRTA Project Description

- ◎ Sponsored by EPA, University of Nevada Reno WSPPN, the Bay Area Air Quality Management District and IRTA under a pollution prevention grant
- ◎ Original focus was to identify, develop, test and demonstrate safer alternative floor wax strippers
- ◎ Project evolved into broader effort
 - Included other methods of reducing or eliminating the use of toxic wax strippers

Description Cont'd

◎ Project aims

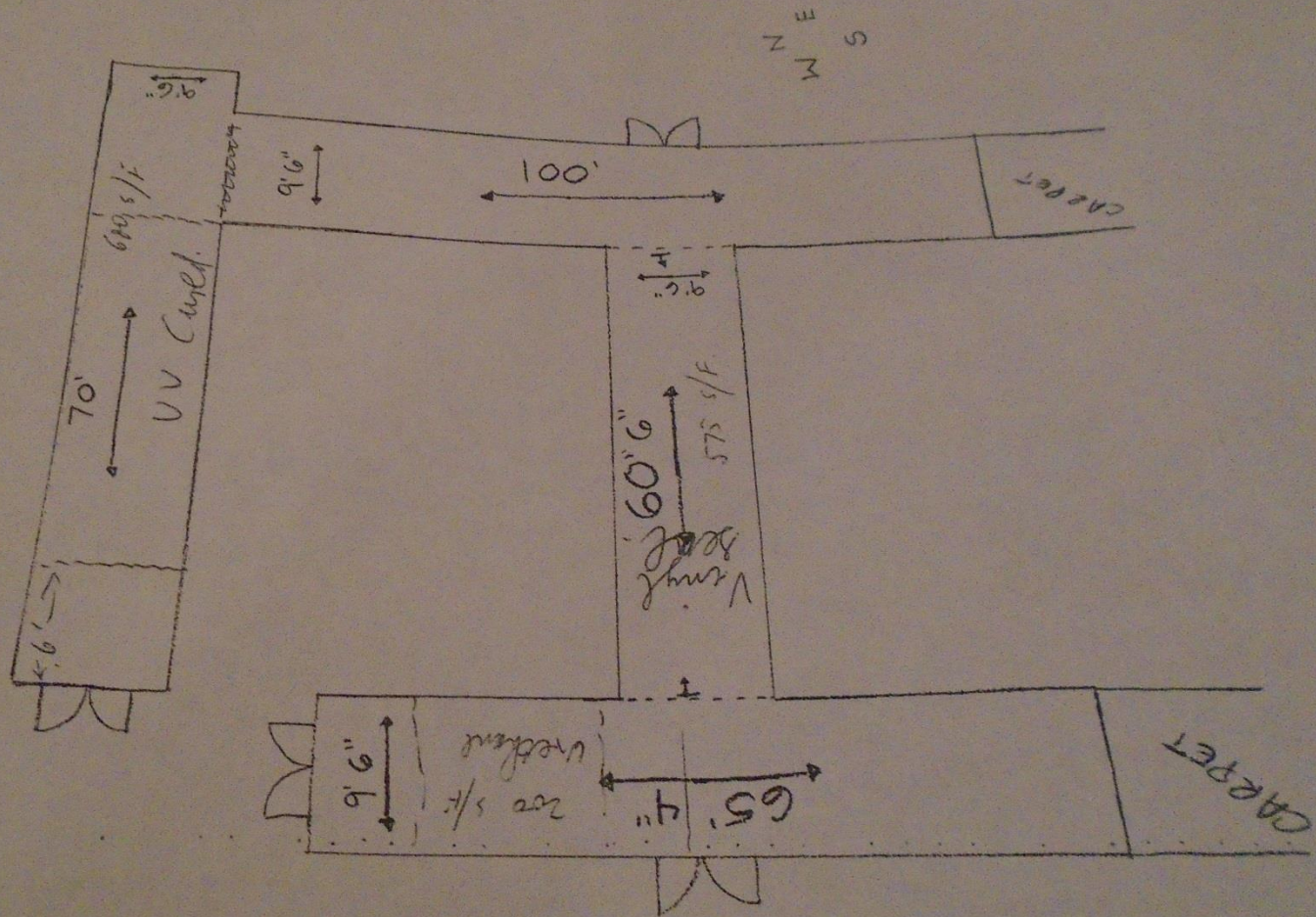
- › Identify, develop, test and demonstrate safer alternative floor wax strippers
- › Investigate, identify and test coatings that can be applied to VCT and don't require waxing and stripping
- › Investigate, identify and test alternative flooring that doesn't require waxing or stripping
- › Compare performance, cost of alternatives

Description Cont'd

- ◉ Project participants helped with testing alternative floor wax strippers
 - > Riverside USD
 - > Irvine USD
 - > San Francisco City Hall
 - > South Coast Air Quality Management District public building
- ◉ Riverside USD helped with testing coatings and flooring

Project Approach

- ◉ Worked with two formulators to develop alternative floor wax strippers
- ◉ Worked with coating manufacturer and supplier to apply coatings in heavily used hallway at Riverside USD school
- ◉ Worked with flooring manufacturers and suppliers to install alternative flooring in heavily used hallway, another hallway and a multipurpose room at Riverside USD schools
- ◉ Monitored coatings and alternative flooring for school year on a monthly basis



N
E
S

Developing Alternative Floor Wax Strippers

- ◎ Aim was to eliminate amines, eliminate toxic solvents, attain zero VOC content and have relatively low pH
- ◎ Tested extensively with Riverside USD to develop three alternative strippers
- ◎ Tested with other school and public buildings to focus in on two best strippers
 - > Eliminated amines
 - > Both strippers have zero VOC content under the CARB regulation
 - > Both strippers have relatively low pH
 - > One stripper has no solvent at all





Results of Floor Wax Stripper Tests

- ◎ Results of tests indicate that one stripper works slightly better than the other
 - > Stripper with solvent
- ◎ One stripper is completely new concept
 - > Stripper contains no solvent
 - > All other strippers on the market contain solvent
- ◎ Strippers work almost as well as non-green strippers and at least as well as other green strippers

Testing Coatings Over VTC

- ◉ Tested three different types of coatings that are representative of floor coatings
 - > Vinyl seal
 - > Polyurethane coating
 - > UV urethane acrylic coating
- ◉ Ensured that coatings met the stringent VOC emissions limits at SCAQMD and BAAQMD and did not contain toxic solvents
- ◉ Coatings do not require waxing and stripping so can use only dry and wet mopping for maintenance





Results of Coating Tests

- ◉ Vinyl seal looked yellow sometime after application
 - > May have been from floor cleaner
 - > Supplier came in and burnished the floor and reapplied topcoat
 - > Coating looked good for balance of year
- ◉ Polyurethane coating had worn off in some recessed areas in floor by end of school year
- ◉ UV cured coating appearance was still very glossy by end of school year

Testing Alternative Flooring

- ◉ Flooring that was tested is specific products/brands but is meant to be representative of range of flooring types
- ◉ Tested three alternative types of flooring in busy hallway
 - > Optima IQ (homogeneous vinyl sheet flooring)
 - > Omni Sports (heterogeneous vinyl with closed cell cushion backing)
 - > Ecopure (linoleum with cork backing)

Testing Cont'd

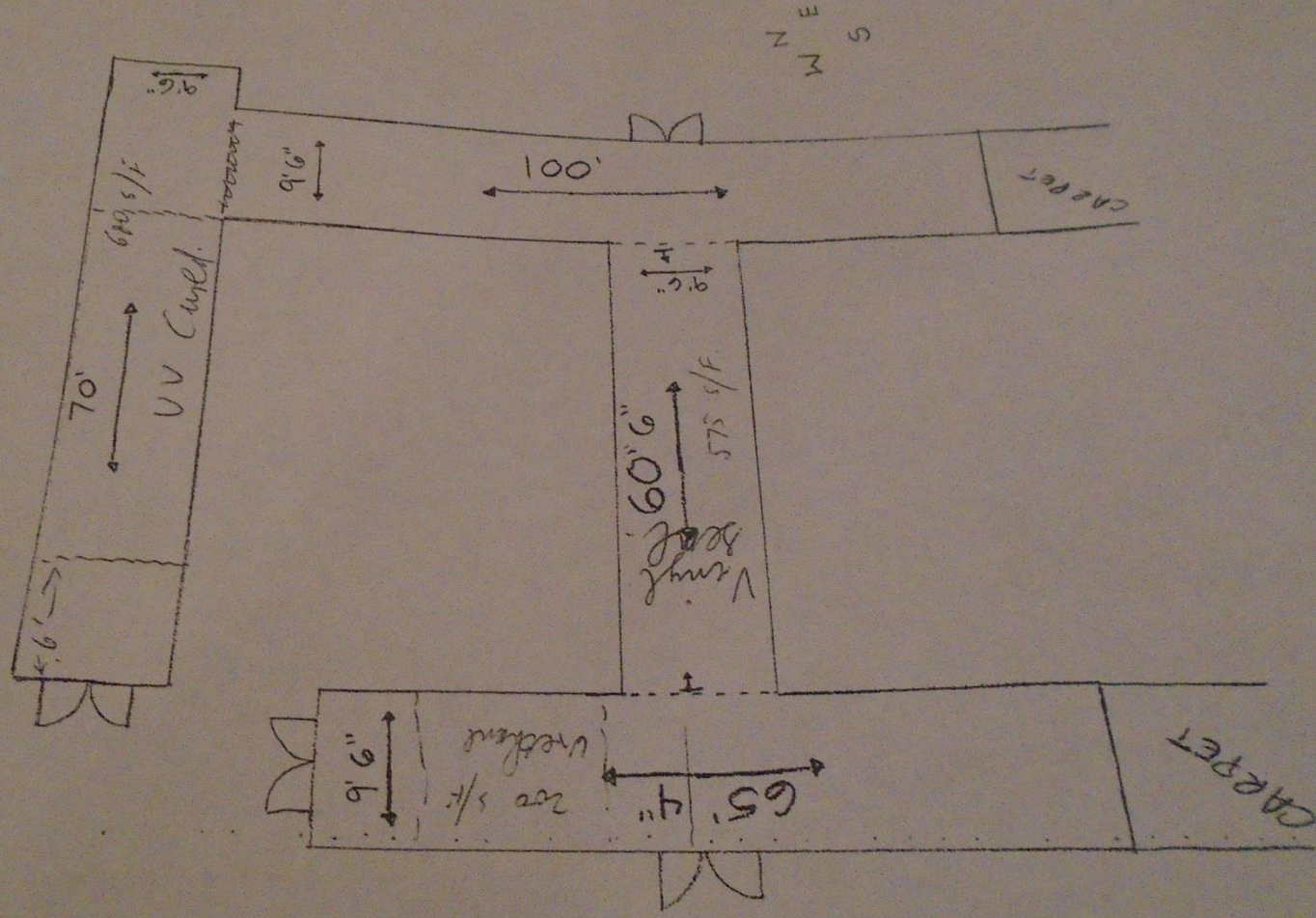
- ◉ One type of alternative flooring already installed in same hallway system
 - › Powerbond (resilient nylon with closed cell cushion backing)
- ◉ Tested one alternative flooring type in entrance way in second school
 - › Centiva Contour (heterogeneous hardened vinyl plank)

Testing Cont'd

- ◎ Tested one alternative flooring type in multipurpose room in third school
 - › Mondo (blend of natural and synthetic rubber)
- ◎ Tested total of six types of flooring and evaluated one additional type
 - › Centiva Mineral Chip (homogeneous hardened vinyl tile with terrazzo look)









Evaluated Alternatives Performance

- ◉ Monthly inspections of coatings and flooring throughout school year
 - > IRTA
 - > Coating supplier
 - > Flooring suppliers
 - > Riverside maintenance supervisors
 - > Riverside maintenance staff



Results of Flooring Alternatives Testing

- ◎ Ecopure lifted up from floor on one side and was rebonded during test period
- ◎ A few of the flooring types had one or two scratches but all looked good by end of testing period
- ◎ Got positive comments particularly on Centiva Contour and Mondo

Cost Analysis for Alternative Strippers

- ◉ Obtained materials and blending cost of two alternative strippers
- ◉ Assumed range of markups (1.3 to 2.0)
- ◉ Compared price after markup to price of a few specific strippers
- ◉ Compared price after markup to range of prices for typical non-green and green strippers
- ◉ Prices of alternatives fall below prices of green strippers and one is below prices of non-green strippers
- ◉ Strippers will be commercialized by WA & Associates

Approach to Cost Analysis for Coatings and Flooring

- ◉ Developed baseline by using data provided by Riverside USD and flooring supplier
- ◉ Evaluated costs of using VCT with dry mopping, wet mopping, burnishing, waxing and stripping
- ◉ Evaluated and compared three scenarios
 - > VCT baseline with waxing and stripping
 - > Using coatings over VCT with no waxing and stripping
 - > Using alternative flooring types with no waxing and stripping

Approach Cont'd

- ◉ Worked with coating and flooring suppliers to obtain information on materials, application, installation costs
- ◉ Amortized preparation, materials, application, reapplication, installation costs over warranty life of coating or type of flooring for case study of 9,600 square feet (10 classrooms)
- ◉ This led to an annualized capital cost
- ◉ Added annualized capital cost and appropriate annual maintenance costs
 - › Dry and wet mopping except for vinyl seal which also needs to be burnished; different procedure for Powerbond

Approach Cont'd

- ◎ Final result was an annual cost of using the coating or flooring type for the case study of 9,600 square feet
- ◎ Determined an annual cost of using the coating or flooring type per square foot
- ◎ Compared the cost of continuing to use VCT with waxing and stripping with using three types of alternative coatings and with seven types of alternative flooring

Results of the Cost Comparison

- ◉ More costly to continue using VCT with waxing and stripping than to use any of the coatings over VCT or any of the alternative flooring
- ◉ Waxing and stripping are most expensive maintenance activity
 - › Labor contribution dominates
- ◉ Results are very dependent on assumptions about warranty life
 - › Suppliers are often conservative because they want to avoid liability

Results Cont'd

- ◎ Using Powerbond is lowest cost option but this type of flooring is not a direct substitute everywhere
- ◎ Lowest cost resilient flooring types are Centiva Contour, Omni Sports and Centiva Mineral Chip
- ◎ Vinyl seal is highest cost coating option
- ◎ UV coating with five year warranty life is comparable in cost to using the three lowest cost resilient flooring options
- ◎ Most costly alternative flooring option is Optima IQ

Results Cont'd

- ◎ Mondo and Ecopure (linoleum) are natural materials and are relatively high cost options
 - › Have more selective applications than other types of flooring
- ◎ Materials cost for VCT is lowest of all types of flooring but the annual installed cost per square foot is higher than four of the alternative flooring types
 - › Architects benefit from selecting VCT but building owners/occupants don't

Health and Environmental Issues

- ◉ Current strippers are asthmagens and sensitizers, may form nitrosamines, some have high VOC emissions, toxic solvents, high pH
- ◉ Coatings may contain toxic solvents, asthmagens and sensitizers
- ◉ Vinyl flooring (VCT and much of resilient flooring) is PVC and may contain toxic plasticizers
- ◉ Powerbond (carpet like flooring made of nylon) is treated with fluorocarbon for stain resistance, may cause global warming
- ◉ Mondo contains latex which may cause allergic reaction

Conclusions

- ◉ Using alternative safer strippers is cost effective and can reduce the risk to maintenance staff, children, teachers and the general public
- ◉ Using VCT with waxing and stripping is highest cost option
- ◉ Coatings applied over VCT and alternative flooring are all lower cost options because they don't require waxing and stripping
- ◉ Coatings are good interim option and alternative flooring is best long term option for existing schools, public buildings
- ◉ Alternative flooring is best option for new schools and public buildings

Contact Information

Dr. Katy Wolf

Institute for Research and
Technical Assistance (IRTA)

8579 Skyline Drive

Los Angeles, CA 90046

Phone (323)656-1121

Cell (818) 371-9260

Fax (818) 656-1122

kwolf.irta@earthlink.net

www.irta.us