

# Safer Alternatives to Floor Wax Strippers

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# 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

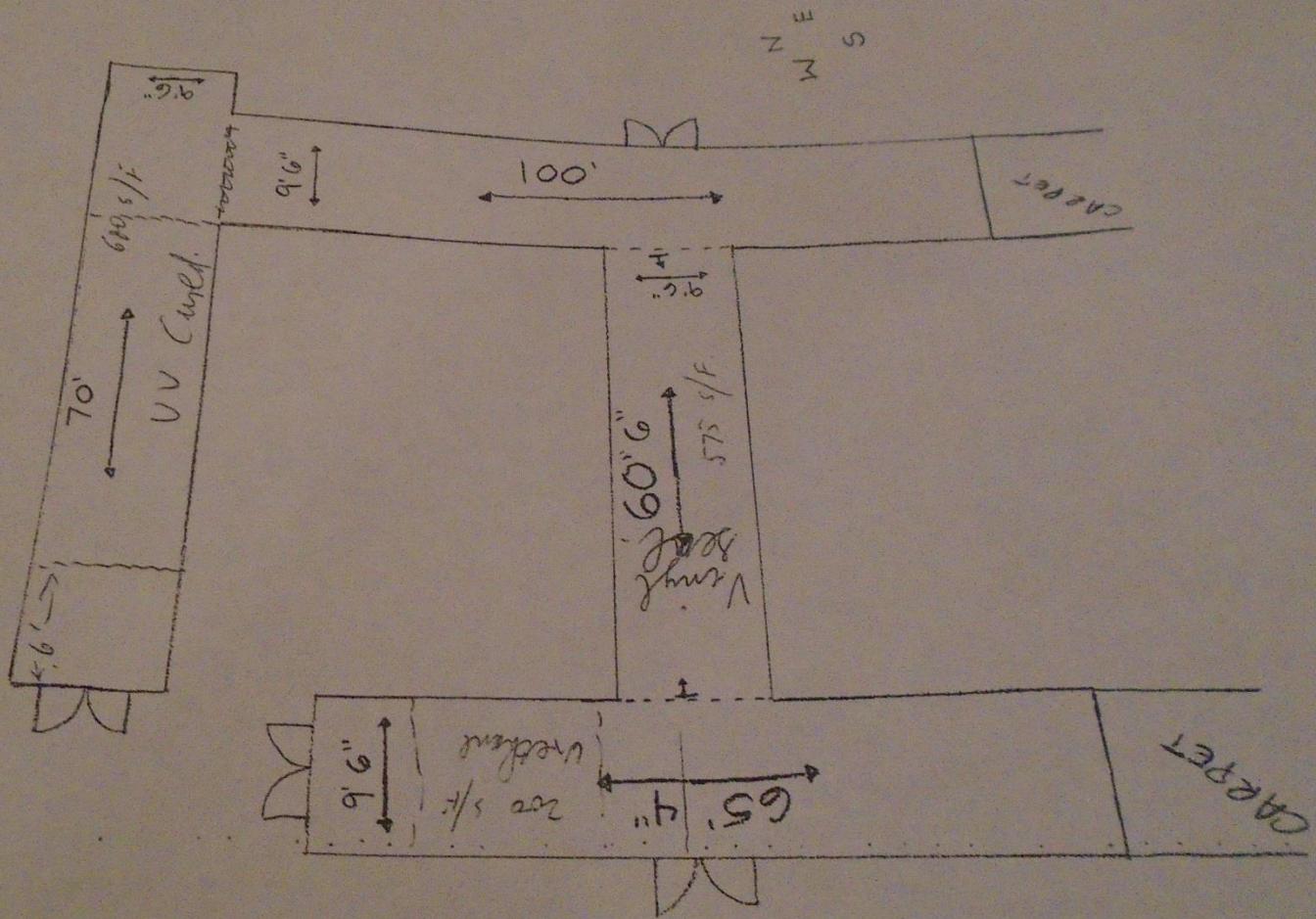
- › Identify, develop, test and demonstrate safer alternative floor wax strippers
- › Investigate, identify and test coatings that can be applied to VCT and don't require waxing and stripping
- › Investigate, identify and test alternative flooring that doesn't require waxing or stripping
- › Compare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



# 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

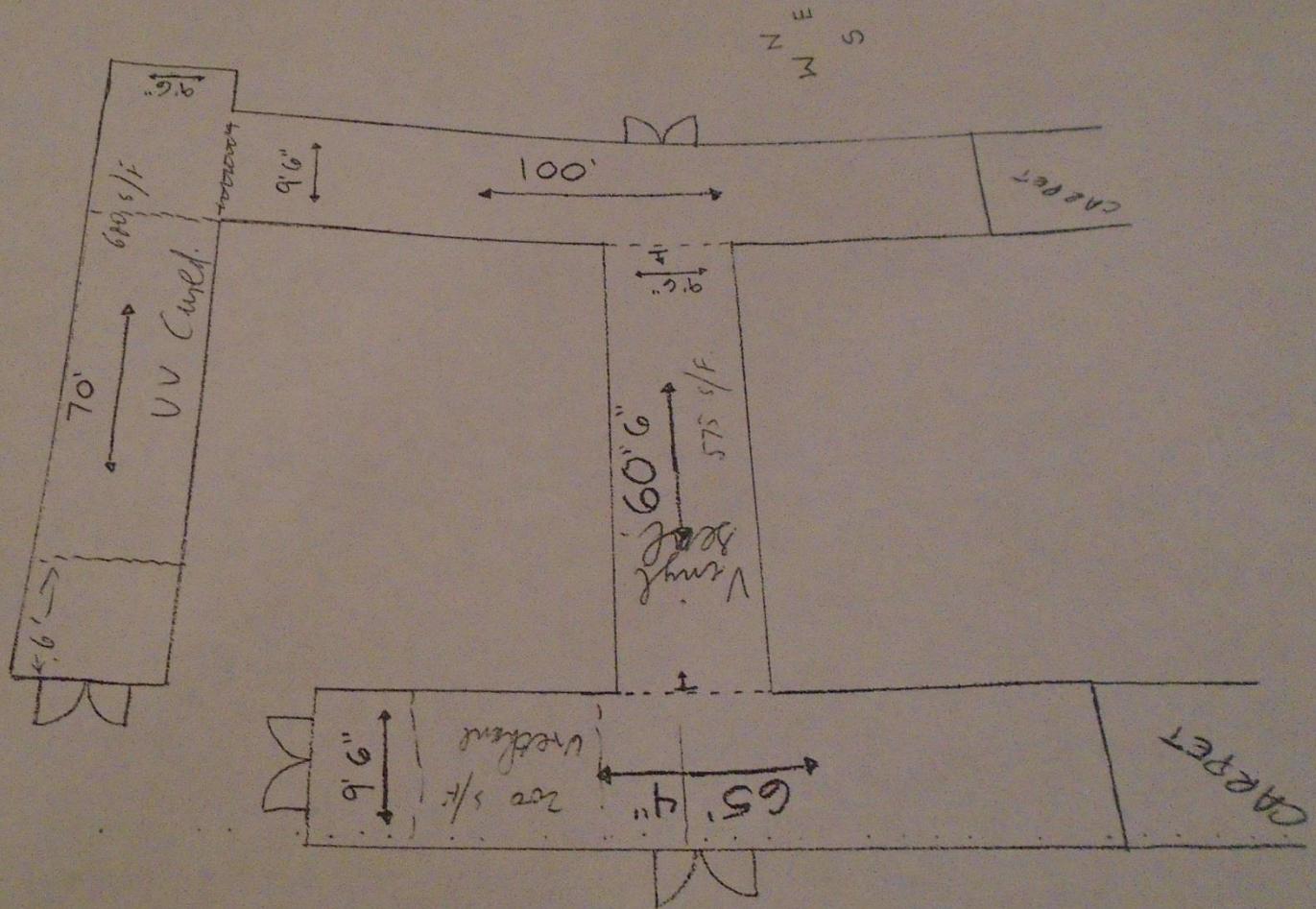
- ◉ One type of alternative flooring already installed in same hallway system
  - › Powerbond (resilient nylon with closed cell cushion backing)
- ◉ Tested one alternative flooring type in entrance way in second school
  - › Centiva Contour (heterogeneous hardened vinyl plank)

# 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

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