

Floor Wax Stripping in Schools and Public Buildings: Safer Alternatives

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General Background

- ◎ There are an estimated 129,000 schools in the U.S.
- ◎ There may be as many as 300,000 public buildings in the U.S.
- ◎ Most schools and public buildings commonly have a type of flooring called Vinyl Composition Tile (VCT)
- ◎ Janitorial staff maintains the flooring

Background on Floor Wax Stripping

- ◎ VCT requires regular waxing to maintain its glossy or shiny appearance
- ◎ Floor finishes applied regularly
- ◎ Floor wax strippers are used routinely to strip floor finishes
- ◎ Janitorial staff often needs to strip multiple coats of wax
- ◎ Staff praised for having glossy floors

Floor Wax Strippers

- ◎ Floor wax strippers used today pose health and environmental problems
 - > Many have high VOC content
 - > Most contain amines which can cause asthma and are sensitizers
 - > Some contain other amines that can form nitrosamines which are carcinogens
 - > Many have high pH
- ◎ Alternative low-VOC, low toxicity safer strippers are needed

Floor Wax Stripping Procedure

- ⦿ Floor wax strippers diluted
- ⦿ Diluted stripper applied to floor
- ⦿ Floor machine with abrasive pad moved over floor
- ⦿ Wait for stripper to loosen wax
- ⦿ Wet vac used to vacuum up removed wax and spent stripper
- ⦿ Rinse water applied to floor
- ⦿ Wet vac used again to vacuum up rinsewater
- ⦿ Spent stripper, wax and water discharged to sewer

Floor Waxes

- ◎ Almost all waxes on the market contain fluorosurfactants
 - > Fluorosurfactants contain fluorine and are PFAS
 - > Studies have shown higher concentrations of PFAS in air during stripping and waxing
 - > PFAS cause many problematic health effects
- ◎ Many waxes also have high VOC content
- ◎ Some older waxes contain toxic ingredients
- ◎ Alternative safer waxes need to be developed

What are the Issues?

- ⦿ Floor wax strippers contain toxic ingredients and can expose workers, children and people in communities surrounding schools and public buildings
- ⦿ Floor waxes contain toxic ingredients including PFAS which can also expose individuals
- ⦿ Additional problem is that PFAS from stripping process is entering the sewer and making its way to the POTWs
- ⦿ Need to focus on safer products and other methods of reducing these health and environmental problems

What are the Options?

- ◎ Continue to use current process
 - > Develop, use safer floor wax strippers
 - > Develop and use safer floor waxes
- ◎ Apply coatings over VCT that do not require waxing and stripping
- ◎ Replace VCT with alternative flooring that does not require waxing and stripping
- ◎ Use different method of stripping floor wax that does not lead to discharge

Efforts to Solve Problem

- ◎ Earlier project sponsored by EPA under a pollution prevention grant
 - > University of Nevada Reno WSPPN, Bay Area Air Quality Management District
 - > Conducted by IRTA
 - > <https://www.irta.us/reports/floorwaxstripfinalrept.pdf>
- ◎ Recent project sponsored by EPA under a pollution prevention grant
 - > Western Nevada College, greenUP!
 - > <https://nvgreenbusiness.org/webinar-series-safer-alternatives-to-toxic-solvents-toxic-ingredients/>

Description of Earlier Project

- ◎ Original focus was to identify, develop, test and demonstrate safer alternative floor wax strippers
- ◎ Project evolved into broader effort
 - > Investigate and test coatings
 - > Investigate and test alternative flooring
 - > Evaluate and compare costs
- ◎ Conducted testing with numerous partners

Past Project Participants

- ◎ 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 formulator and distributor 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 Safer Alternative Strippers

- ◉ Ended up with two strippers that don't contain amines and have relatively low pH
- ◉ One stripper contains solvent and the other is solvent free
- ◉ Some project participants liked solvent containing stripper the best because it left a tacky floor
- ◉ Strippers were commercialized after Covid



Testing Coatings Over VCT

- ◎ 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





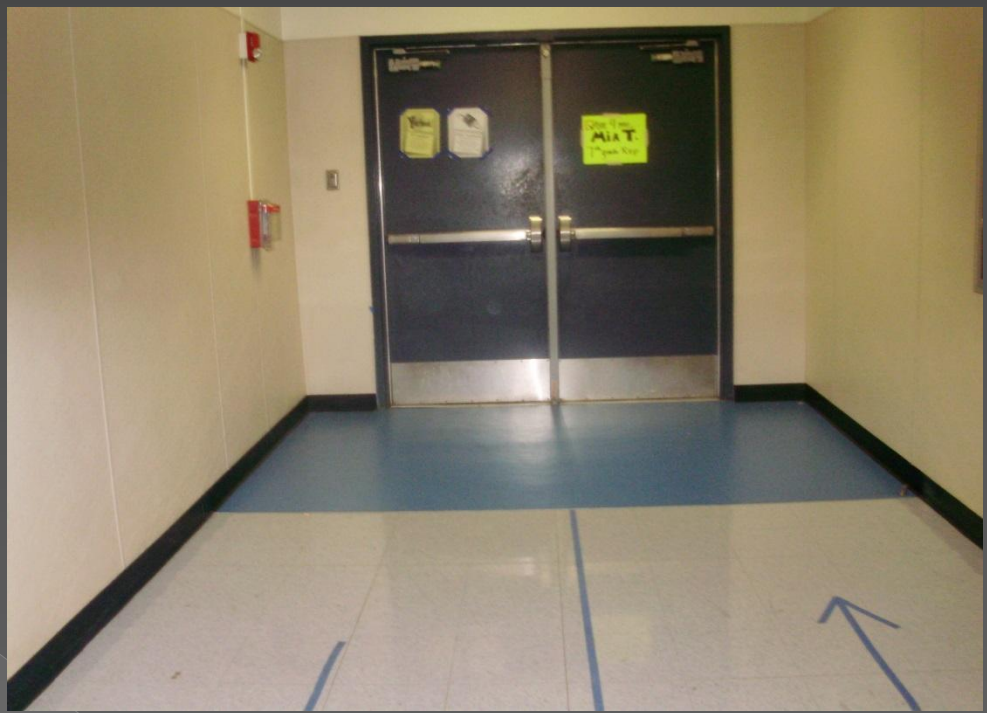
Results of Coating Tests

- ◉ Monitored coatings on a regular basis for a school year
- ◉ First application of a UV coating to a floor
 - > Failed for this application
- ◉ Vinyl seal yellowed and had to be reapplied
- ◉ Polyurethane coating started coming off in corners of room
- ◉ Coatings need to be reapplied at certain intervals

Testing Alternative Flooring

- ◎ Flooring that was tested is specific products/brands but was meant to be representative of range of flooring types
- ◎ Tested total of six types of flooring and evaluated one additional type
 - > Optima IQ (homogeneous vinyl sheet flooring)
 - > Omni Sports (heterogeneous vinyl with closed cell cushion backing)
 - > Ecopure (linoleum with cork backing)
 - > Powerbond (resilient nylon with closed cell cushion backing)
 - > Centiva Contour (heterogeneous hardened vinyl plank)
 - > Mondo (blend of natural and synthetic rubber)







Results of Alternative Flooring Tests

- ◉ During monitoring 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 and Comparison

- ◎ 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
- ◎ 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
- ◎ Cost information is no longer accurate but may be representative

Flooring/Coating Type	Annual Cost
VCT (New/Replacement)	\$3.39/\$3.65
Vinyl Seal (18 Month Life)	\$2.23 old/\$2.11 new
Vinyl Seal Reap	\$1.66
Polyurethane (3 Year Life)	\$1.96
Polyurethan Reap	\$1.65
UV (5 Year Life)	\$1.72
UV Reap	\$1.53
Optima IQ	\$2.17
Ecopure (Linoleum)	\$1.94
Omni Sports	\$1.54
Centiva Contour	\$1.43
Centiva Mineral Chip	\$1.56
Powerbond	\$0.66
Mondo	\$2.06

Health and Environmental Issues Identified in Earlier Work

- ◉ Strippers developed during project are better option than others on the market
- ◉ 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 and is PFAS, also may be treated with toxic anti-microbials
- ◉ Mondo (blend of natural and synthetic rubber flooring) contains latex which may cause allergic reaction

Recently Completed Project

- ◉ Project funded by EPA under a Pollution Prevention grant awarded to WNC and greenUP!
- ◉ Original project aim was to try to get EPA Safer Choice labels for industrially relevant products
- ◉ Safer Choice focuses on giving labels to consumer products and institutional products and is not designed to give labels to industrial products
- ◉ Focus of project changed to work with suppliers and manufacturers to further commercialize and promote safer products and technologies and to test existing technologies in new applications

Description of Recently Completed Project

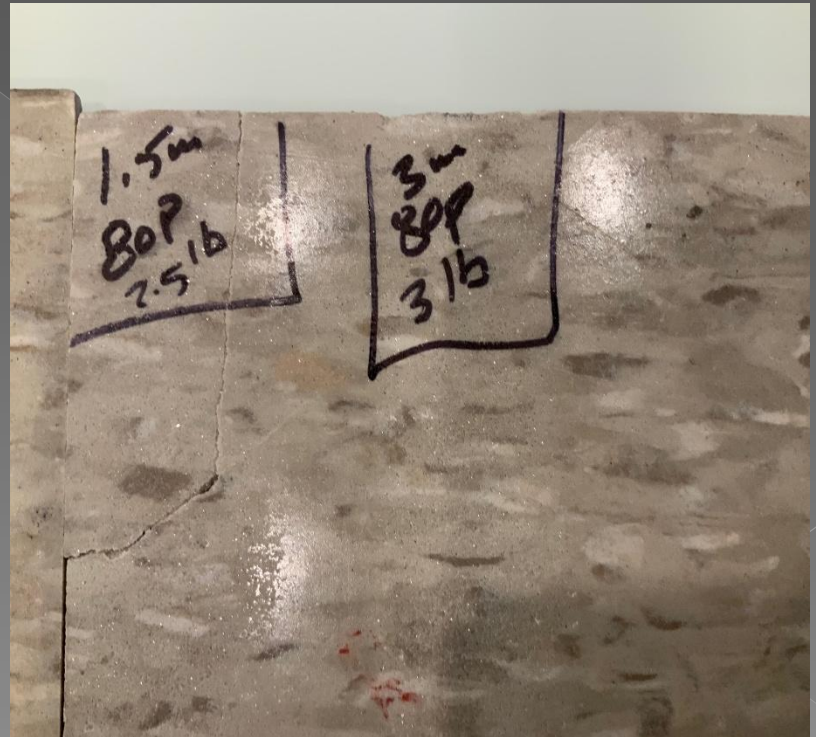
- ◎ Part of project involved collaboration between nonprofit organization, greenUP!, and manufacturers, suppliers and acquisition contractor
- ◎ Focused on schools and further commercialized and promoted safer floor wax strippers
- ◎ Tested dry ice blasting technology for wax removal
- ◎ Also tested newly developed graffiti remover and dry ice blasting for graffiti removal with schools

Testing of Safer Floor Wax Strippers and Technology

- ◉ Acquisition contractor works with school districts in California, Arizona and Nevada
- ◉ Arranged for testing of two floor wax strippers in school district in California
- ◉ Tested dry ice blasting for wax removal on panels and floor
- ◉ Prepared and distributed outreach material for many other school districts
- ◉ Efforts on floor wax stripping were part of a larger effort that also included graffiti removal for schools
- ◉ Project involved developing success story
 - > <https://nvgreenbusiness.org/wp-content/uploads/2025/09/Graffiti-Success-Story-Final.pdf>

Results of Testing

- ◎ Tests of floor wax strippers were very successful and staff that tested them indicated they performed very well
- ◎ Tested dry ice blasting on panels with three or four layers of floor wax
 - > Flooring expert indicated that test results were promising
- ◎ Tested dry ice blasting on school floor with several layers of wax
 - > Tests on floor were not successful, took too long and did not strip effectively



Current Efforts on Solving Problems

- ◎ New project conducted by greenUP!
- ◎ Working with acquisition contractor to promote floor wax strippers for schools in California, Arizona and Nevada
- ◎ Working with formulator and distributor to develop floor wax with no fluorosurfactants
- ◎ Working with coating manufacturer to test two safer coatings that have promise for application to VCT
- ◎ Working with flooring supplier to develop better and less costly alternative flooring as replacement for VCT

What are Overarching Issues?

- ◎ POTWs are facing a severe problem for cleanup
- ◎ Cleanup is very important but we also have to work on preventing additional streams from entering the sewer
 - > Focus has been on streams from consumers and fire fighting
- ◎ Hundreds of thousands of schools and public buildings are continuing to discharge PFAS
 - > May need to pass regulations that prevent discharge

Conclusions

- ◎ Using alternative safer strippers is cost effective and can reduce the risk to maintenance staff, children, teachers and the general public
- ◎ Work on safer wax without fluorosurfactants is essential for schools and public buildings continuing to use VCT
- ◎ Alternative flooring for new and existing schools and public buildings is good option
 - > Can replace about 70% of VCT
- ◎ Coatings without toxic ingredients and with longer life are another good option

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