

# The Alternative

IRTA Newsletter

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## CARB Selects Option for Amending PERC Dry Cleaning ATCM

The California Air Resources Board (CARB) held a workshop on November 29 to present input on their likely course of action in amending the statewide perchloroethylene (PERC) regulation. In October 1993, the Airborne Toxic Control Measure (ATCM) was adopted and it became state law in June 1994.

For the last few years, CARB has been evaluating whether and how to strengthen the ATCM. As part of this effort, CARB established a workgroup composed of dry cleaning industry association representatives, equipment manufacturers, dry cleaners and solvent suppliers. CARB also conducted surveys, visited several dry cleaning sites, performed limited sludge testing, contracted with IRTA to evaluate the PERC alternatives (see article in this issue) and reviewed the work of other air districts.

The survey results indi-

cate that dry cleaners are small businesses, most with fewer than five employees. Ninety-five percent of dry cleaners have one PERC machine and the majority are located in shopping centers. There are about 5,000 dry cleaning facilities in the state and 85 percent of them use PERC. About 190 of the cleaners use PERC and an alternative, 400 of the cleaners use the hydrocarbon DF-2000, 90 use Green Earth and 60 use various other technologies. The data indicate that more than 10 percent of the cleaners use a PERC alternative.

CARB concludes, from the analysis, that alternatives to PERC dry cleaning are available and viable and that preliminary health risk assessment results indicate that the cancer risk posed by PERC is a concern. CARB is considering two possible options to amend the ATCM. The first option is to require a phaseout of

PERC. Because of issues with the alternatives including the fact that hydrocarbon is a VOC, health impacts, market acceptance and cost, CARB made it clear at the workshop that the agency would not select this option.

The second option is to strengthen the existing ATCM. Possible actions under this option would include phasing out primary controlled machines, prohibiting the use of converted machines, forbidding PERC machine operation in new facilities that are co-located with a residence, requiring use of vapor barrier rooms and secondary control machines in existing facilities co-located with a residence and establishing unspecified citing criteria.

CARB has not yet completed the risk assessment for PERC dry cleaning. Nearly all (see *PERC Regulation* page 6)

## IRTA Completes Report on Screen Printing Alternatives

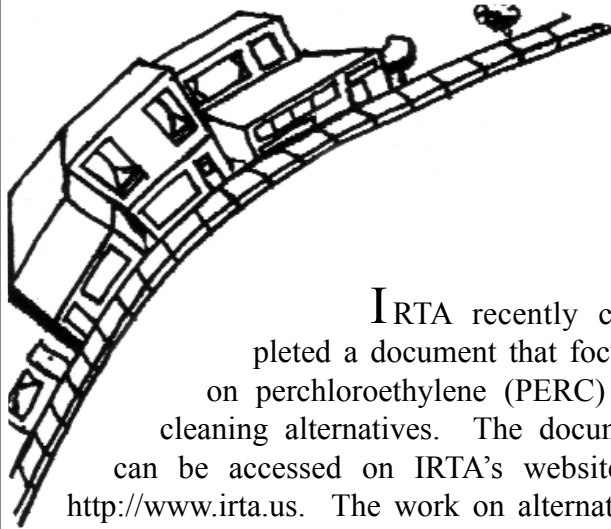
### Report Available on Website

IRTA recently completed a report for the South Coast Air Quality Management District (SCAQMD) on low-VOC, low toxicity alternatives. The report will be available shortly on IRTA's website at <http://www.irta.us>.

SCAQMD Rule 1171 regulates the VOC content of cleanup materials that can be used in screen printing. The VOC limit for these cleaners historically was 750 grams per liter. On July 1, 2005, the VOC limit for the cleaners was lowered to

500 grams per liter. The District has set a future VOC limit of 100 grams per liter which becomes effective on July 1, 2006.

IRTA worked with a few printers to test low VOC alternatives in an earlier project sponsored by the District (see *Screen Printing* page 5)



## IRTA Completes Report on PERC Dry Cleaning Alternatives Report Available on Website

IRTA recently completed a document that focuses on perchloroethylene (PERC) dry cleaning alternatives. The document can be accessed on IRTA's website at <http://www.irta.us>. The work on alternatives was conducted as part of a project sponsored by the California Air Resources Board (CARB) and U.S. EPA. CARB wanted information on the alternatives because they were considering additional regulations to strengthen the Airborne Toxics Control Measure (ATCM) on PERC dry cleaning (see article on CARB in this edition of The Alternative). U.S. EPA Region IX is interested in the alternatives because they would like dry cleaners to adopt safer processes.

During the project, IRTA evaluated eight different alternatives to PERC including hydrocarbon, Pure Dry, Green Earth, glycol ether, traditional wet cleaning, icy water, Green Jet and carbon dioxide. IRTA worked with 14 cleaners that had adopted the alternative technologies. Nine of these case study plants converted from PERC dry cleaning to one of the alternatives and five of them adopted the new alternative upon startup. IRTA evaluated the performance and cost of the alternative technologies for all 14 case study facilities and compared the performance and cost of the alternatives to PERC dry cleaning for nine of the facilities. The findings indicate that all of the cleaners that adopted the alternatives were satisfied with the new technologies, even those cleaners that increased their costs through the conversion.

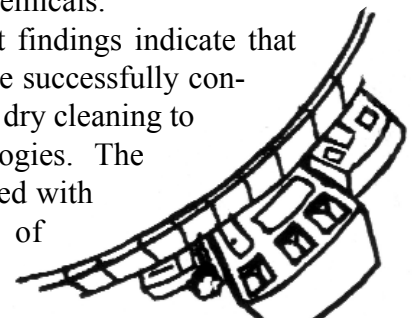
IRTA also generalized the results of the case study facilities to the industry as a whole by performing a model plant analysis. A small model plant cleaning 40,000 pounds of clothing annually and a large model plant cleaning 100,000 pounds of clothing annually were evaluated. The effects of the increasing price of PERC because of a fee and the grants provided by the South Coast Air Quality

Management District (SCAQMD) and CARB were incorporated into the analysis. In general, the results of the model plant analysis indicated that the cost of some of the technologies are lower than, comparable to or slightly higher than the costs of PERC dry cleaning. This applies to hydrocarbon, Green Earth, Green Jet, icy water and traditional wet cleaning. The glycol ether and carbon dioxide technologies had higher costs than PERC dry cleaning.

During the project, IRTA partnered with the Los Angeles County Sanitation Districts to sample and analyze certain waste and discharge streams that arise from use of the alternative technologies. The sampling was performed at a limited number of facilities so readers should be cautious in extending the results to the industry as a whole. The findings indicated that the still bottom generated from distillation of the glycol ether, Green Earth and carbon dioxide are classified as hazardous wastes whereas the still bottom from distillation of the hydrocarbon is not. Separator water generated in the glycol ether, Green Earth and hydrocarbon processes was not classified as hazardous waste.

Four wash and rinse effluents from wet cleaning facilities were also analyzed. Some of the streams contained PERC and/or trichloroethylene (TCE), another toxic chlorinated solvent. Wet cleaning effluent streams that contain PERC and TCE above a certain level would be classified as hazardous waste and they could not be discharged to the sewer. The likely source of the PERC and TCE is spotting chemicals.

The project findings indicate that many cleaners have successfully converted from PERC dry cleaning to alternative technologies. The cleaners are satisfied with the performance of the alternatives



*Illustration by Todd Schmid*

*(see Dry Cleaning page 5)*

## Fay Cleaners Converts From PERC to Wet Cleaning

Fay Cleaners is located in Long Beach, California. In the past, the shop used perchloroethylene (PERC) and processed about 39,000 pounds of clothing per year. Fay now uses the wet cleaning process and processes the same amount of garments.

“I didn’t want to use PERC anymore,” says Lisa Tsan, owner of Fay Cleaners. “I wanted to start using the wet cleaning process.” Fay installed a 45 pound wet cleaning machine and cleans all the clothing in that machine.

“I used PERC for a year and my customers complained that the clothes were not clean,” says Ms. Tsan. “The clothes are

cleaner with wet cleaning and they smell better.”

“There is more spotting and more finishing with wet cleaning,” says Ms. Tsan. In the wet cleaning process, the garments are washed and dried for three minutes. They are hung up to dry in the facility for two hours

with a fan providing air movement. The garments are then finished with the tensioning equipment.

Ms. Tsan prefers the wet cleaning process even though it requires more labor. “Wet cleaning is a good process,” she says. “It’s better for the environment.”

	PERC	Wet Cleaning
Annualized Capital Cost	-	\$3,605.00
Solvent Cost	\$480.00	-
Detergent Cost	-	\$2,340.00
Electricity Cost	\$3,600.00	\$2,400.00
Gas Cost	\$3,000.00	\$4,200.00
Spotting Labor Cost	\$6,240.00	\$7,800.00
Finishing / Maintenance Labor Cost	\$24,960.00	\$31,200.00
Compliance Cost	\$520.00	-
Waste Disposal Cost	\$600.00	-
<b>Total Cost</b>	<b>\$39,400.00</b>	<b>\$51,545.00</b>

## Santa Ana Screen Printer Adopts Water-Based Cleaner

Powerhouse is located in Santa Ana, California. The company, with four employees, provides services to the contract apparel industry. Most of the company’s business is printing on T-shirts.

IRTA began work with Powerhouse as part of a project sponsored by the South Coast Air Quality Management District (SCAQMD). The aim of the project was to identify, test and demonstrate low-VOC, low toxicity alternatives for cleaning ink in textile printing. The SCAQMD regulation requires cleanup materials to have a VOC content of 100 grams per liter or less by July of 2006.

For several years, Powerhouse used a parts cleaner that contained mineral spirits for cleaning the screens. Nick Fortune, the owner of Powerhouse, has 23 years of experience in the industry. “We

participated in the project because we wanted to see if there were better cleaners out there.”

Powerhouse initially tested four alternative cleaners by hand. Three of the cleaners were water-based and one was a soy based material. “One of the water-based cleaners worked well and the soy cleaner cleaned the ink best,” said Nick Fortune. IRTA provided Powerhouse with a plastic parts cleaner to perform longer-term testing of the best performing alternatives. The company first tested the soy based cleaner. According to Mr. Fortune, “the soy cleaned well but it dissolved the adhesive we used to make the screens.” IRTA provided larger quantities for testing the water-based cleaner and the Powerhouse employees found that it worked very well. “The water-based cleaner worked so well, we decided to buy the

parts cleaner,” said Mr. Fortune.

Powerhouse converted to the low-VOC water-based cleaner several months ago and it has worked successfully since then. Using the water-based cleaner is less costly than using the mineral spirits. Says Mr. Fortune, “I got a new cleaner that’s better for my employees and the environment, but I also saved money.”

	Mineral Spirits	Water-Based Cleaner
Annualized Capital Cost	-	\$88
Servicing Cost	\$1,863	\$456
Cleaner Cost	-	\$435
Electricity Cost	\$21	\$83
<b>Total Cost</b>	<b>\$1,884</b>	<b>\$1,062</b>

## IRTA Starts New Project on Spotting Chemical Alternatives


IRTA recently initiated a project designed to focus on finding alternative low-VOC, low toxicity spotting chemicals. The project is sponsored by Cal/EPA's Department of Toxic Substances Control (DTSC) and U.S. EPA Region IX.

IRTA completed a project on alternative technologies to PERC dry cleaning (see article in this issue of *The Alternative*). As part of this project, IRTA worked with the Los Angeles County Sanitation Districts to sample and analyze some of the waste and effluent streams from the alternative technologies. PERC and/or trichloroethylene (TCE) were found in the effluent streams from most of the wet cleaning facilities. In a project currently underway with DTSC on the

hydrocarbon process, PERC and TCE were also found in the separator water and sludge from hydrocarbon cleaners.

PERC and TCE are used in some spotting agents called POGs which stands for Paint, Oil and Grease removers. Some cleaners that have adopted wet cleaning apparently are still using these spotting agents. Cleaners that have adopted other chemical alternatives to PERC dry cleaning are also still using the same spotting agents. The problem with PERC and TCE containing spotting agents is, if the chemicals contaminate the effluent streams from wet cleaning, the effluent could be classified as hazardous waste. Under such conditions, it is illegal to discharge hazardous waste to the sewer. Some of the

cleaners using other alternatives may have separator water or sludge that would be classified as hazardous waste simply because of the presence of PERC or TCE.

The project IRTA is initiating will involve identifying alternative low-VOC, low toxicity POG spotting agents. If these are available, IRTA will test them in cleaning facilities that use all of the alternatives. If they are not available, IRTA will find and/or develop new formulations and will also test them in cleaning facilities that employ the alternatives. The project will involve comparing the performance and cost of the PERC and TCE containing spotting agents to the alternative POG spotting agents. The project should be completed in about a year. 


## IRTA Starts New Project on TBAC

IRTA recently initiated a project to evaluate alternatives to tert-butyl acetate (TBAC). EPA deemed the chemical exempt from VOC regulations in 2004. The California Air Resources Board (CARB) and the South Coast Air Quality Management District (SCAQMD) are moving forward and exempting it in California for certain applications. TBAC forms a metabolite called tert-butyl alcohol (TBA) that is a carcinogen.

TBAC is not used in California today because it is more expensive than other VOC

solvents. TBAC will be used in applications where CARB and SCAQMD exempt it (see article in this issue) and it will substitute for other materials that are lower in toxicity. The Office of Environmental Health Hazard Assessment (OEHHA), based on toxicity studies, has calculated a cancer risk factor for TBA. The Hazard Evaluation System & Information Service (HESIS), which is part of the California Department of Health Services, has calculated that TBAC, used at the current worker exposure level, would pose a risk to work-

ers of 7.4 percent or 74,000 in a million based on the OEHHA risk factor. This is an extremely high risk and is of great concern.

IRTA's project on TBAC is sponsored by U.S. EPA. It involves assessing where TBAC is likely to be used in California because of its exemption from VOC regulations. It also involves identifying and evaluating alternatives to TBAC that are safer. HESIS will assist IRTA in comparing the risk from TBAC and the potential alternatives. 


Visit our website: [www.irta.us](http://www.irta.us)

Read back issues of "The Alternative" and recently completed reports.

**Dry Cleaning** (Continued from page 2)

even in cases where the technology is more expensive to use. Most of the alternative technologies have costs that are lower, comparable to or slightly higher than the cost of using PERC dry cleaning. The findings also indicated that several cleaners using the alternative technologies are still using spotting chemicals containing PERC and TCE. IRTA has just initiated a project to find alternative low-VOC, low toxicity spotting chemicals (see arti-

cle in this issue of The Alternative).

One of the facilities that served as a case study in the project was Fay Cleaners. This cleaner converted from PERC to traditional wet cleaning. IRTA published the case study for this cleaner in the Summer 2005 edition of The Alternative. There were several errors in this case study and IRTA is publishing the corrected version of the case study in this edition of The Alternative. IRTA apologizes to Fay Cleaners for the mistake. 

**Screen Printing** (Continued from front page)

sored by SCAQMD. More recently, IRTA completed a project sponsored by Cal/EPA's Department of Toxic Substances Control (DTSC) and U.S. EPA. The current SCAQMD report that was just completed includes information on all the facilities IRTA worked with in the DTSC project and the facilities IRTA worked with in the SCAQMD project.


The earlier SCAQMD report did not provide enough information on low-VOC, low toxicity alternatives for textile printers. These printers account for perhaps two-thirds of the industry. They generally provide contract cleaning services for customers that want printing on T-shirts, sweaters, hats and other garments. During the DTSC project, IRTA worked with three textile printers to test alternatives. In the current SCAQMD project, IRTA also tested alternatives with three textile printers. The alternatives that were found to perform best for these operations include soy based cleaners and water-based cleaners for cleaning during recycling. Acetone based alternatives performed best for in-process cleaning.

Some textile printers clean their screens by hand and others use a parts cleaner to clean the screens. Solvents that are commonly used include mineral spirits, toluene, xylene, MEK and glycol ethers. Two of the printers IRTA worked with in the recent SCAQMD project cleaned their screens with parts cleaners containing mineral spirits and the third cleaned the screens by hand with solvent pur-

chased at hardware stores.

One soy based cleaner and three water-based cleaners proved effective for cleaning screens by hand. One of the water-based cleaners was preferred by the two other screen printers for cleaning in a parts cleaner. The water-based cleaner was tested at one of the screen printing facilities for about two months. The other screen printer tested the water-based cleaner for a few months and decided to convert to this alternative. A case study for this facility, Powerhouse, is included in this edition of the newsletter. The cost analysis indicated that, for printers with parts cleaners, using the water-based cleaner is less costly than using mineral spirits. The cost analysis also indicated that, for printers using hand cleaning, the cost of using the alternatives would be higher.

The soy based cleaner was a very effective cleaner for two of the facilities that participated in the earlier DTSC project. The only disadvantage of the soy based cleaner is that it leaves a residue on the screens which must be rinsed before the screens are stored.

Textile printers interested in alternatives that can meet the 100 gram per liter VOC limit for 2006 can contact Katy Wolf or Mike Morris at IRTA at (818) 244-0300. Other screen printers looking for the same kind of information should also contact IRTA. 

### Need Help Finding An Alternative?

IRTA assists firms in converting to suitable alternatives in cleaning, paint stripping, coating, electronics and adhesive applications.

For more information contact IRTA at: 818-244-0300

## CARB and SCAQMD Exempt TBAC in Autobody Industry

Tert-butyl acetate (TBAC) is a solvent that was deemed exempt from VOC regulations by EPA in 2004. TBAC is not automatically exempt in California unless CARB also exempts it. In the South Coast Basin, the South Coast Air Quality Management District (SCAQMD) must also exempt chemicals before they can be used to meet lower VOC limits. TBAC is more expensive than most VOC solvents and some other exempt solvents.

The problem with TBAC is that it forms a metabolite called tert-butyl alcohol (TBA) that is a carcinogen. The Office of Environmental Health Hazard Assessment (OEHHA) calculated a risk factor for TBA based on available toxicity studies. Using this risk factor, the Hazard Evaluation System & Information Service (HESIS) calculated a risk to workers for TBAC of 7.4 percent or 74,000 in a million if the chemical is used at the current

worker exposure limit.

The CARB Research Division examined whether or not TBAC should be exempted from VOC regulations. The Division recommended that CARB exempt the chemical in autobody applications and consumer product applications. On October 20, CARB took action to exempt TBAC in their Suggested Control Measure (SCM) for VOC emissions from automotive coatings. This SCM provides guidance to the air districts in California and encourages the districts to adopt a uniform statewide standard. TBAC is exempted in the SCM for all coatings and for all cleanup solvent applications in the automotive industry. On December 2, SCAQMD also took action to exempt TBAC from VOC regulations for some automotive coating applications.

Waterborne coatings for the autobody industry were developed in Europe (*see TBAC page 7*)

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### **PERC Regulation** (Continued from front page)

PERC dry cleaners are located near residences or other businesses and, even with good equipment, they pose a risk between 25 and 100 in a million based on air district calculations. It is not clear how CARB could reduce this risk significantly by implementing the actions listed above. The SCAQMD accounts for half the dry cleaners in the state and is phasing out PERC dry cleaning in 2020. In 2007, in the South Coast Basin, PERC dry cleaners will have to meet much more stringent risk levels. CARB's proposed actions are not likely to have any effect in reducing the risk from PERC dry cleaners in the South Coast Basin.

At the workshop, CARB indicated strong concerns about the alternatives. The only two alternatives CARB is comfortable with are wet cleaning, which does not have acceptance as a stand-alone technology by the industry, and carbon dioxide, which is expensive. The alternative that is most widely used, hydrocarbon, is a VOC and CARB has calculated that if all PERC cleaners converted to hydrocarbon, there would be an increase in VOC emissions statewide of two tons per day. CARB has stated that this reduction cannot easily be made up elsewhere but an emissions reduction four times this level could be achieved by CARB through regulat-

ing automotive aerosol cleaning products where there are low-VOC, safer alternatives. CARB is apparently also concerned about health effects of the alternatives. Green Earth toxicity data indicate that the chemical has caused cancer in laboratory animals. The Office of Environmental Health Hazard Assessment (OEHHA) is reviewing the most recent toxicological information on Green Earth and will decide whether it is an issue or not. There is no reason, from structure activity data, to assume that the hydrocarbon would have high toxicity.

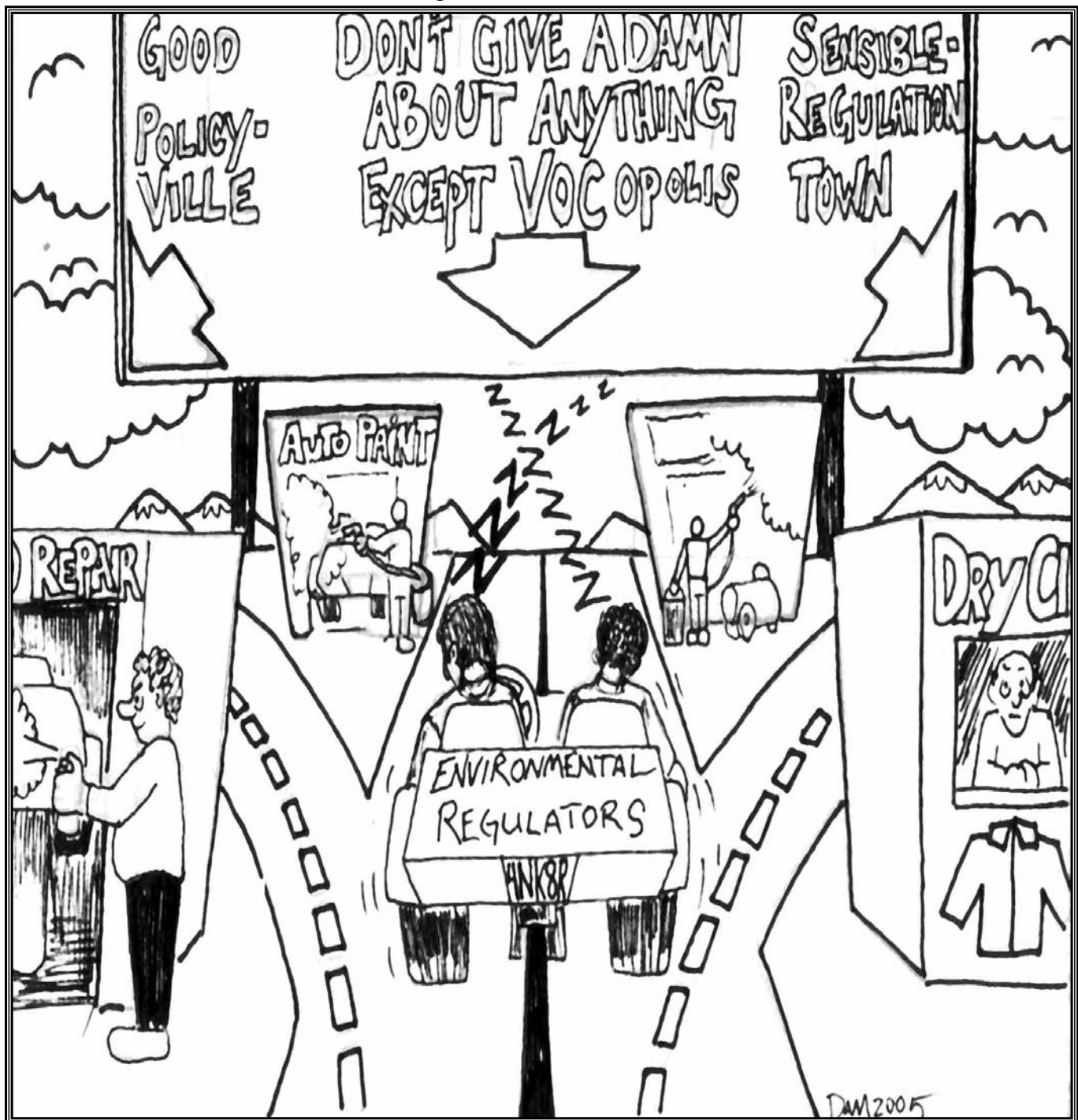
The SCAQMD adopted a regulation to phase out PERC dry cleaning and at least half the cleaners in the state will convert over the next 15 years. Dry cleaners are converting and will continue to convert to alternatives for other reasons, including pressure from landlords. The vast majority of cleaners lease their shops and they generally have 10-year leases. Virtually all landlords are now requiring cleaners to use a PERC alternative and, over the next several years, as the leases are renegotiated, there will be a significant transition away from PERC.

CARB has not yet completed or made available the risk assessment figures. It is not clear why CARB has decided which option to select without all the input required to make such a decision. ☹

**TBAC** (Continued from page 6) and stringent VOC limits have been adopted there; the European regulations does not allow the use of exempt chemicals. Virtually all the automotive coatings regulated by CARB and SCAQMD can be formulated with water or with safer alternative exempt chemicals like acetone. Even so, both agencies decided to provide the exemptions for greater "flexibility." CARB also exempted TBAC for use in cleanup formulations in the automotive SCM. IRTA conducted a project with SCAQMD and U.S. EPA on low-VOC coating application equipment cleanup materials and found safe alternatives. There is no need to exempt TBAC

in cleaning applications.

TBAC is not used in California today. The recent actions by CARB and SCAQMD will ensure that TBAC is adopted widely in the automotive industry. CARB and SCAQMD are already moving forward to exempt the chemical in the architectural coating industry. Both agencies have demonstrated they believe that reducing VOC emissions is of the highest priority. They have adopted regulations to obtain VOC reductions that will put thousands of California workers and residents at high risk from a carcinogen.



# CALENDAR

**February**

California Air Resources Board, Workshop on PERC Dry Cleaning ATCM. For more information, call Mei Fong at (916)324-2570

**March 12-14**

NHA Annual Hydrogen Conference 2006, Global Progress Toward Clean Energy, Long Beach, California. For more information, access: [www.hydrogenexpo.com](http://www.hydrogenexpo.com)

**March 27-30**

WESTEC Advanced Productivity Exposition, Los Angeles Convention Center, Los Angeles, California. For more information, call (800)733-4763

**April 20-21**

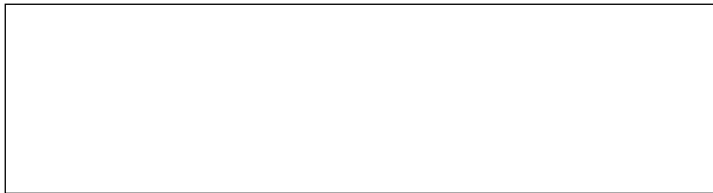
The 17th Global Warming International Conference and Expo (GW17), Miami, Florida. For information, contact: [gw17@globalwarming.net](mailto:gw17@globalwarming.net)

**IRTA** is working together with industry and government towards a common goal -- implementing sensible environmental policies which allow businesses to remain competitive while protecting and improving our environment. IRTA depends on grants and donations from individuals, companies, organizations, and foundations to accomplish this goal. We appreciate your comments and contributions!

- Yes! I would like to support the efforts and goals of IRTA.  
Enclosed is my **tax-deductible** contribution of: \$ \_\_\_\_\_
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**Institute for Research and Technical Assistance**  
 230 N. Maryland Ave., Suite 103  
 Glendale, CA 91206  
 website: [www.irta.us](http://www.irta.us)



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