



The Alternative

IRTA Newsletter

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IRTA Completes Report on Cleaning Alternatives for Pharmaceutical Industry

Over the last few years, IRTA has worked on a project, sponsored by Cal/EPA's Department of Toxic Substances Control (DTSC) and EPA, that focused on finding safer alternatives for reactor tank and associated equipment cleaning. IRTA recently completed a draft document that analyzed several options for reducing or eliminating the use of solvents in these cleaning operations.

There are more than 1,200 chemical manufacturing companies in California. Various types of solvents are used by these companies in cleaning operations. In particular, companies with batch and campaign operations must change out their product feedstocks frequently when they begin producing a new product. The reactor tanks, dryers, valves and hoses require cleaning on a regular and frequent basis in such companies. The solvents used by the companies may be classified as VOCs and/or toxics and virtually all of them require disposal as hazardous waste.

IRTA partnered with a progressive pharmaceutical company called AMPAC which is located near Sacramento for part of the project. AMPAC had received recognition and several awards for their good environmental stewardship. IRTA and AMPAC developed a work plan that involved conducting screening tests to identify safer alternatives that might be used by pharmaceutical companies or chemical companies in cleaning operations. The alternatives that were tested included different water-based cleaners and a few solvents that are low in toxicity and exempt from VOC regulations or have low VOC content.

IRTA and AMPAC developed a protocol for the screening tests which involved testing the alternatives on coupons that had been soiled with one of AMPAC's products, an oil and

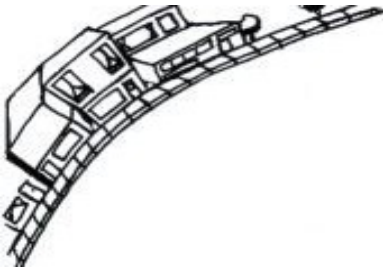
grease soil or a carbon soil. Six alternatives were tested at various concentrations and temperatures by AMPAC staff over about a two month period. The results indicated that two of the alkaline water-based cleaners performed well. One soy based cleaner, propylene carbonate and another neutral water-based cleaner also performed well on some of the soils. IRTA's report summarizes the results of the screening tests.

In the report, IRTA also analyzed a hypothetical process hose cleaning operation. Hoses are used by pharmaceutical and chemical companies to transfer the feedstocks and products to and from the reactors. They are generally made of stainless steel mesh and are lined with Teflon. When products are changed out, the hoses need to be cleaned on a regular basis. IRTA analyzed hypothetical cases which involve cleaning 10 hoses per day for a small operation and 20 hoses per day for a large operation.



IRTA analyzed the cost of six options for reducing the use of solvents in the hose cleaning operations and four options for eliminating the use of solvents altogether. The six options for reducing the use of solvent included using acetone exclusively in the cleaning operation, eliminating one of the solvent hose flushing operations, using a lower volume of solvent in the hose flushing operation, sending the spent

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Small Business Corner

SCAQMD Proposes Exemption for TBAC and DMC in Rule 1107

The South Coast Air Quality Management District (SCAQMD) has delayed the Board hearing date for adoption of Rule 1107 "Coating of Metal Parts and Products." The District held a workshop on June 15 and has also held three working group meetings since then.

The District is proposing to exempt tert-butyl acetate (TBAC) and dimethyl carbonate (DMC) from VOC regulations in Rule 1107. This issue has become more complex and the rule, which was originally scheduled for Board hearing in September, will now be delayed until first quarter 2012.

TBAC forms a metabolite, tert-butyl alcohol, that is a carcinogen. DMC is a developmental toxin and it forms methanol as a metabolite. In a draft report, EPA has indicated that methanol may be a carcinogen. The industry intends to use TBAC in several coatings to meet the VOC limits the District is imposing in Proposed Rule 1107. It is likely that the formulators will also use TBAC in coatings that are currently formulated with water, acetone and PCBTF if the District Board adopts the rule and the exemption. Many blenders would rather use a "drop-in" solvent alternative because they have little chemistry or formulation expertise. In fact, waterborne coatings are available today in this industry, they are cost effective and they could be used to comply with the new lower proposed limits.

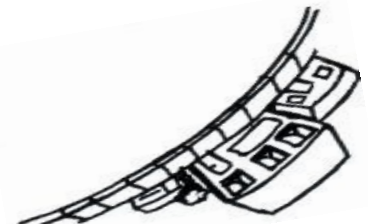
IRTA is opposing the exemption of TBAC and DMC in Rule 1107 because of the toxicity of the solvents. To mitigate the toxicity issues, the District has considered setting a limit on the amount of TBAC that could be used by a facility and requiring the facility to obtain a permit or modify their existing permit if they exceeded the limit. It turns out, however, that the limit is so high that virtually no facilities would have to obtain or

modify a permit.

The District calculates the risk to the surrounding community and to workers in nearby facilities to determine the limit for the amount of TBAC that could be used. Because the community members and off-site workers are far away from the source of emissions, their risk is relatively low. In contrast, however, the risk posed to the workers applying the TBAC based paint and using the solvent for cleanup and thinning can be extremely high. In the metal coating industry, in particular, many small facilities apply these paints. A very high number of the facilities, perhaps a majority, applies the paints outside a spray booth where there is little ventilation and these facilities do not have permits. The District does not regularly inspect these facilities and, in many cases, does not even know who they are since they do not have permits. Nearly all facilities, whether they have a spray booth or not, perform cleanup and thinning outside the booth. As a result of adopting the exemption, hundreds, maybe thousands of workers will be exposed to very high risks from TBAC.

The District does not consider the risk to workers when they adopt and modify rules. They do not believe it is their responsibility to consider the worker risk. Rather, that responsibility falls to Cal/OSHA. At this stage, very few workers are exposed to risks from TBAC because the chemical is expensive and is considered a VOC. If the District does adopt the exemption in the rule, however, many formulators will use the chemical and workers will be heavily exposed to the solvent.

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solvent off-site for reuse or reutilization by another company, sending the solvent off-site for recycling and recycling the spent solvent on-site for reuse in the hose flushing operation. Acetone is a good choice as an exclusive solvent because it is not classified as a VOC and it is lower in toxicity than nearly all other organic solvents.

IRTA also analyzed four options for eliminating solvent use in the hose flushing operations. These involved converting to one of two different water-based cleaners in a low or higher volume flushing operation. The two water-based cleaners that were considered were those that performed best in the screening tests.

The results of the analysis indicate that the lowest cost options are converting to water-based cleaners. Other options that are relatively low cost are purchasing a distillation system for recycling the solvent so it can be reused on-site, converting to low volume flushing and eliminating one of the two solvent flushes.

Options that could be implemented immediately are sending the solvent off-site for reutilization by another company or sending the

solvent off-site for recycling. Whether companies can exercise these options depends on the quality of the solvent. The off-site recycler would analyze the solvent and judge whether the quality is high enough to merit reutilization or recycling.

Options that could be implemented over the short to medium term are using acetone exclusively, reducing the number of flushes, reducing the volume of the flushes and on-site recycling. Some testing would be required to decide whether these options could be implemented.

Options that could be implemented over the medium to long term are conversion to a water-based cleaner for the process hose flushing. Testing different cleaners under various circumstances would be required to implement these options.

The document should be finalized over the next few months and it will be available on IRTA's website at www.irta.us. For more information on the details of the report, call Katy Wolf at IRTA at (323) 656-1121.

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It is the District's action that will prompt the increased risk so the District, not Cal/OSHA, has the responsibility of considering and mitigating the risk they are creating.

What is the risk to workers? Based on an evaluation conducted by the Office of Environmental Health Hazard Assessment (OEHHA) of the cancer potency value, the Hazard Evaluation System & Information Service (HESIS) calculated the risk of TBAC to a worker. The OSHA PEL for the chemical is 200 ppm. This limit was set many years ago and does not reflect the fact that TBAC, through its metabolite, poses a cancer risk. Under various assumptions, HESIS calculated a risk ranging from 74,000 in one million to 380,000 in one million for a worker exposed to TBAC at the PEL. This is an extremely high risk.

The District's action in exempting TBAC in Rule 1107 is not acceptable, based on the very high risk the workers applying, thinning and cleaning up the coatings will face. It will lead to a very large increase in the use of TBAC because of the District's sanction of the solvent. TBAC will end up being used in place of many other chemicals that are lower in toxicity including water, acetone, PCBTF, toluene and MEK. None of these materials is a carcinogen.

The District staff has decided, in this case, to consider the risk to the workers' applying the paints. The staff planned to perform the risk calculations over the next few months.

For more information on the TBAC exemption, contact Katy Wolf at IRTA at (323) 656-1121.

IRTA Completes Panel Tests with Port of San Diego

IRTA and the Port of San Diego initiated a third set of panel tests to study alternatives to copper antifouling paints in August 2010. The panels were inspected on a regular three week schedule for a year and they were removed from the water in August of this year. IRTA worked on the panel testing as part of a project sponsored by Cal/EPA's Department of Toxic Substances Control (DTSC) and EPA. The project involves finding methods of making it easier and less costly to use alternative nonbiocide paints. The copper biocide paints used today have caused a copper buildup in many basins in California.

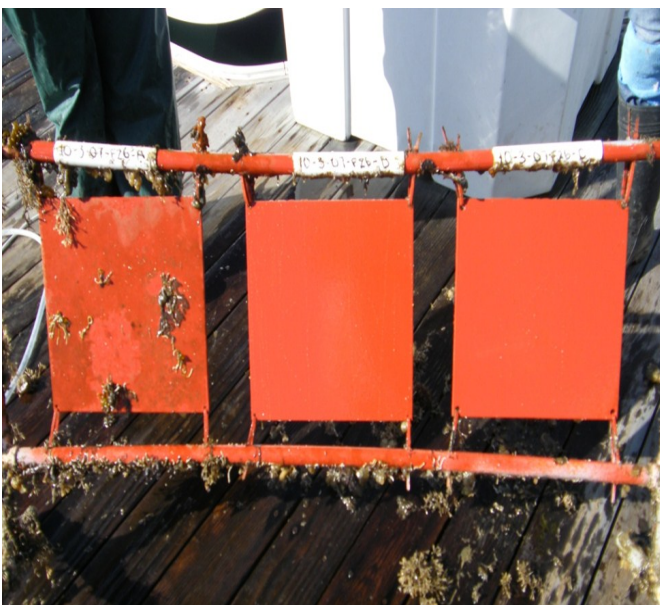
The protocol for the panel testing was developed during an earlier project in which IRTA partnered with the Port of San Diego. The protocol involved painting a set of three panels in a panel assembly with a coating and conducting inspections every three weeks. The inspections included an assessment of the fouling on all three panels and a cleaning protocol. The first panel in the assembly was not cleaned during the period, the second panel was cleaned with a carpet every three weeks, representing the standard cleaning method of diving companies and the third panel was

cleaned according to the paint suppliers' instructions. The panels were painted at Knight & Carver, a boatyard in San Diego and the assemblies were attached to floating docks at a San Diego yacht club.

The panel testing included 16 new alternative nonbiocide paints. Six of the paints were soft nonbiocide paints based on silicon and fluoropolymer compounds. Eight of the paints were hard nonbiocide paints based largely on epoxy. Two of the paints were nanotechnology paints. IRTA and the Port monitored the panels regularly and conducted the cleaning of the second and third panels. This gave IRTA a good perspective on which coatings might perform well on boats and would be easy to clean.

Several of the paints performed well during the panel testing and IRTA identified those during the inspections and found boaters willing to test them on their boats. Six of the coatings performed very well and were easy to clean and IRTA worked with the suppliers to put four of them or slight modifications of them on boats. IRTA also put another coating, tested in the first set of panel tests in the Port of San Diego/IRTA project, with slight modifications, on a few boats recently. The progress of the coatings on the boats is being monitored to determine their performance.

For more information on panel testing or the paints, call Katy Wolf at IRTA at (323) 656-1121.



IRTA and Port of San Francisco Touch Up Boat Water Line Paint

In the spring issue of *The Alternative*, one of the articles described a Port of San Francisco boat that was painted with an emerging paint. The boat was painted with the coating, called XZM 480, in January. It was pulled out of the water and inspected in April to determine the fouling pattern so a cleaning schedule could be devised. IRTA had substantial experience in the fouling patterns and hull cleaning needs of boats in Southern California but did not know how the lower temperatures and fouling patterns in Northern California would influence the cleaning needs for the Port.

The boat had not been used during the timeframe and the hull did have very small barnacles and some algae that had attached. Both were easy to remove with light hand pressure. The boat was driven at fairly high speed for a short period, pulled out of the water and inspected again. Most of the fouling was removed by the boat moving through the water. IRTA, the supplier and the Port thought that any fouling would be relatively easy to remove in the future. Even regular use might be enough to prevent fouling.



One problem the team observed when the boat was pulled out was that the paint appeared to be damaged around one side of the water line. This may have been a result of the boat hitting or bumping up against the dock. The team agreed that the boat should be pulled out at a

later time and the coating would be touched up on the water line. The water line was painted in August. This time, a hardener was added to the coating which was very soft.



IRTA is testing alternative nonbiocide paints as part of a project sponsored by Cal/EPA's Department of Toxic Substances Control (DTSC) and EPA. The project involved a year long panel testing effort that included several alternative nonbiocide paints (see article in this issue of *The Alternative*). The XZM 480 was one of the paints that IRTA and the Port of San Diego included in the panel tests. Because it did well in the panel tests, IRTA wanted to try it on a boat. It was put on the Port of San Francisco boat and a Department of Fish and Game Boat with a hardener added (see last issue of *The Alternative*).

The Port of San Francisco and IRTA plan to follow the boat over the next few months. The water line repair will be easily inspected without removing the boat from the water. Driving the boat regularly may be enough to keep the hull clean of fouling without the need for hull cleaning.

For more information on the boat or the paint, contact Katy Wolf at IRTA at (323) 656-1121.

Visit our website: www.irta.us

Read back issues of *The Alternative*

and recently completed reports.

IRTA Plans Two More Paint Operations

IRTA is working on a project, sponsored by Cal/EPA's Department of Toxic Substances Control (DTSC) and EPA. The project aim is to find methods of making it easier and more cost effective to use safer alternative nonbiocide paints for boat hulls. The copper paints that have been used for many years leach from the paints and enter the water from hull cleaning and the copper concentrations have built up in many basins and marinas in California to dangerous levels.

The two factors that make paint jobs using nonbiocide paints higher cost than paint jobs for copper paints are stripping the paint and spraying the paint. Most suppliers of the alternative nonbiocide paints recommend that the boat hull be stripped the first time the paint is applied and that the paint be sprayed rather than rolled on. Copper paint is most often applied over itself without hull stripping and it is rolled on rather than sprayed. Stripping a 30 foot boat can cost between \$2,500 to \$3,000. Spraying the paint can increase the cost by \$600 to \$1,000.

Boats are generally stripped by hand sanding the paint off the hull or by chemical stripping. IRTA is analyzing alternative methods of stripping that are better from an overall health and environmental standpoint and are less costly. IRTA is also examining rolling the alternative coatings on



rather than spraying.

During the project, IRTA has been involved in painting eight boats. Alternative stripping methods were used for a few of the boats and most of the paints were rolled on. IRTA is also investigating another method of applying the alternative paints that does not involve stripping the boat. It does involve preparing the surface as for a copper paint job. Then a "sealer" is applied over the copper paint and the nonbiocide paint is applied over the sealer. This is a new method still in the developmental stage but a few suppliers have sealers they have used on an experimental basis. IRTA has worked with the suppliers and boatyards to apply paint using the sealer over copper on four of the eight boats painted so far. IRTA is planning to apply a sealer to another boat with copper paint shortly. This method should be even more cost effective than using an alternative stripping method and may make it easier for boaters to decide to go with a nonbiocide paint instead of a copper paint.

IRTA is also planning to apply an emerging paint to a Port of San Francisco boat over the next month or so. This is an aluminum hull 14 foot boat that has never been painted. The paint, which is a silicon/fluoropolymer material will be rolled on. The new paint has never been tested on a boat.

The project final report includes an analysis and comparison of the cost of different stripping methods and use of the sealer. It also includes a description of the boats painted using emerging paints and alternative application methods during the project. The report should be available within the next few months.

For more information on the alternative application methods, call Katy Wolf at IRTA at (323) 656-1121.

SB 623 Copper Bill Withdrawn

In the last issue of The Alternative, one of the articles focused on a bill developed by Senator Christine Kehoe of San Diego. The bill was introduced by the Senator on February 18 and was revised a few different times. It passed through the Senate Appropriations Committee and was in the Assembly ready for a vote in the Appropriations Committee. After deliberation, the Senator decided to hold the bill in the Assembly Appropriations Committee and make it a two-year bill. The plan is to move the bill forward next year.

This bill addressed the copper that has been used for several years in boat hull paints. These paints are a source of copper releases to basins and marinas throughout California. In many cases, the concentrations are at high levels and the water quality has been impaired.

The bill had two major provisions. First, the bill would require the use of low copper leachrate paints beginning in 2015. The Department of Pesticide Regulation (DPR) is required to specify what paints meet the requirement. Second, in 2019 the State Water Resources Control Board must determine if use of the low leachrate paints has resulted in attainment of water quality objectives in Cali-

fornia basins and marinas. In the event that the Board determines these objectives have not been met, then the use and application of copper and alternative biocide paints will be banned.

The Senator decided that there was not enough time in the time remaining this year to resolve some of the outstanding issues. The State Water Board believed there was more information required on the procedures they would use to determine whether the water quality objec-



tives could be met. As a consequence, the bill instead will become a two-year bill and some of the remaining issues will be resolved next year.

**Need help finding an alternative?
 IRTA assists firms in converting to suitable
 alternatives in cleaning, paint stripping, coating,
 thinning, dry cleaning and other applications.**

Calendar

October 7, 2011

South Coast Air Quality Management District 23rd Annual Clean Air Awards Luncheon. The luncheon will be held at the Millennium Biltmore Hotel, 506 South Grand Avenue, Los Angeles, CA. For information, contact Lourdes Cordova Martinez at (909) 396-3214.

Mid October, 2011

Expected release of Cal/EPA's Department of Toxic Substances Control (DTSC) draft Green Chemistry Regulation to the public. The regulation is expected to

serve as a model for other regulations in the nation. The focus is on certain consumer products.

First Quarter, 2012

Governing Board Hearing for Proposed Amended South Coast Air Quality Management District Rule 1107 "Coating of Metal Parts and Products." SCAQMD Headquarters, Diamond Bar, CA. For information, call Mike Morris at (909) 396-3282.

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: \$ _____
- I would like to receive more information about IRTA.
- Please send me a brochure.

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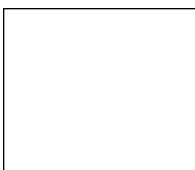


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