

FY04 Goal – Contact Cleaner Replacement

The main goal of the P2 (Pollution Prevention) Committee's Affirmative Procurement/ Environmentally Preferable Purchasing (AP/EPP) project was to replace hazardous toxic chemicals with safer, healthier alternatives. But, an additional goal, also impacting the environment, was to replace ozone depleting substances (ODS). The Montreal Protocol specifies that all developed countries, including the U.S. must phase out ODS chemicals according to a time schedule. As the more damaging Class 1 ODS chemicals were phased out, they were replaced with Class 2 HCFCs. But, as of January 1, 2003, even the HCFCs were being phased out.

HCFC-141b (1,1-dichloro-1-fluoroethane) was (and is still) a widely used propellant and solvent that dried quickly and left no residue. When HCFC-141b was banned in 2003, it was banned only from manufacture, not from distribution and sale. Many chemical product companies have stocks of products containing this ODS, and actively market these products. HCFC-141b was an ingredient in many of our electrical contact cleaners at NASA Glenn Research Center (GRC), including as a much-demanded stock item. The P2 Committee's goal was to implement a substitute for the contact cleaners that contain HCFC-141b.

Finding a good AP/EPP electrical contact cleaner replacement was one of the most difficult application replacements. The concerns when choosing a contact cleaner are that it must be: non-ODS, non-flammable, low global warming potential, low in hazardous chemicals (needed for corrosion inhibition), plastic-friendly, quick drying, and low residue. Some of these were competing goals, with quick-drying chemicals possibly being flammable.

GRC had its own equipment-related problems to add to the mix. Many of the electrical units at GRC are older, and some do not have the safety features of newer units, making flammability a major concern. Since most of the workers at GRC get their cleaners from stock, we could not take the chance of stocking a flammable and non-flammable version of the cleaners. So, we had to come up with a wide-application, non-flammable contact cleaner that performed many tasks well.

The Calibration Lab tested five products, with Techspray G3 performing the best. It is non-ODS, non-flammable, safe for most plastics, quick dry, low residue, and average global warming potential when compared with similar products. It does contain a high amount of Trans-1,2-Dichloroethylene (t-DCE) (30-90%), but this is most likely what enabled the product to perform as well as it did. Above exposure limits, t-DCE can cause liver, circulatory, and central nervous system effects. But the products targeted for replacement also have health effects, e.g., one product contains a carcinogen (methylene chloride), and above limits can cause liver and urinary system effects and permanent brain damage.

The stock area is now purchasing Techspray G3 instead of the many other ODS-containing contact cleaners, defluxers, and precision cleaners they had stocked in the past.

Another remaining concern is that the replacements for HCFCs, especially in contact cleaners, are PFCs (perfluorocarbons), that have a high global warming potential. For chemical companies or the Environmental Protection Agency to come up with another alternative is the next major step.