

FY04 Goal – Machine Shop Chemical Replacement

In October 2001, a Pollution Prevention Opportunity Assessment (PPOA) was created by NASA Glenn Research Center (GRC) to find viable alternatives for hazardous machine shop chemicals. Coolants, cutting fluids, and marking dyes that were in use contained MEK (methyl ethyl ketone), toluene, xylene, 1,1,1-trichloroethane, 1,2-butylene oxide, 1-butanol, and other hazardous ingredients.

The purpose of the PPOA was to find alternatives for the GRC machine shops, for a healthier workplace and cleaner environment. But the additional goal was to add to GRC's AP/EPP (Affirmative Procurement/Environmentally Preferable Products) list, to be made available at GRC, and eventually to the general government and public.

Researchers found several replacement products, which were tested by several machine shops at GRC, and found to perform just as well as their hazardous counterparts. The replacements and their major ingredients are as follows:

Cutting, lubricating, and coolant fluid replacements:

- 1) Safetap: 70-80% water, 5-10% triethanolamine
- 2) Accu-lube LB-1100: 75-85% glyceridic vegetable oils, <10% surfactants, <10% esters
- 3) Tap Magic Eco Oil: ~90% vegetable oil base & ~10% polyol (highly refined petroleum)

Marking dye replacements:

- 4) Rocol Layout Ink Spray - Acetone (30-60%), xylene (5-15%), toluene (1-5%)
(Not tested, but researched and found to be AP/EPP and recommended by the PPOA:)
- 5) Dykem Blue Layout Fluid – Ethanol (30-50%), butyl acetate (10-30%), 1-butynol (1-10%)

The following machine shops at GRC use the chemicals indicated (different product uses in parentheses):

		<u>Status</u>
Bldg 301	Cutting, lubricating and coolant (CLC) (1)	Now use #3, above
Bldg 104	Marking dyes (2)	No longer use
Bldg 34	Marking dyes (2)	If needed, will use #4, #5
10X10 Wind	CLC (1), Marking dyes (1)	Now use #1, #2, #4
Bldg 50	CLC (1), Marking dyes (1)	Referred #1, #3, #4, #5
Bldg 14	CLC (1), Marking dyes (2)	Referred #1, #3, #4, #5
Stock	Replaced hazardous stock choices	Now stocking #1-#5

Not in original list of machine shops with hazardous chemicals, but open to trying:

(Now that all preferable items versus hazardous items are stocked, replacements will occur through attrition, whether the areas chooses to switch or not – except Plum Brook.)

8X6 Wind	CLC (1), Marking dyes (1)	Will try #1-#5
9X15 Wind	Unknown	Referred #1-#5
Plum Brook	Unknown	Referred #1-#5

GRC now has four successfully tested machine shop AP/EPP products; 7 permanent replacements in the 10X10 Wind Tunnel, Building 301, and stock; four hazardous uses no longer needed (or replaced, if needed), and 5 areas (7+ applications) open to replacing once they test.