CLEANING LABORATORY EVALUATION SUMMARY

SCL #:	2018
DateRun:	02/19/2018
Experimenters:	Hayley Byra
ClientType:	General
ProjectNumber:	Project #2
Substrates:	Copper
PartType:	Coupon
Contaminants:	Lubricating/Lapping Oils
Cleaning Methods:	Immersion/Soak
Analytical Methods:	Gravimetric, Visual
Purpose:	To evaluate the effectiveness of five TCE alternatives at removing lubricating oils from copper alloys.
Experimental Procedure:	Six contaminates were evaluated with only two cleaners (Micro 90 and Shopmaster) to determine the hardest to remove soils. Eighteen copper coupons were tested for each cleaner. Initial weights were recorded, and three coupons were soiled for each contaminant using a handheld swab to cover the bottom third of the substrate. The coupons were then immersed, three at a time, in a beaker with 250ml of the chosen diluted cleaner at room temperature (68 F) for five minutes. Visual observations were taken during this time, and final weights were recorded after cleaning. This process was repeated for each cleaner on all six contaminants. After determining the most difficult soils to remove the procedure was repeated with additional cleaners.

Results:

Cleaner	Soil	Initial wt.	Final wt.	Final % Removed	Average % Removed
Micro 90	Oak 15A	0.0498	0.0478	4.02	3.62
		0.0271	0.0264	2.58	
		0.0939	0.0899	4.26	
	Oak 529	0.005	0.001	80.00	51.41
		0.0066	0.005	24.24	
		0.0034	0.0017	50.00	
	Oak 15C	0.0493	0.0487	1.22	3.22
		0.0459	0.0444	3.27	
		0.058	0.055	5.17	
	Oak 941-A	0.1505	0.1184	21.33	10.69
		0.0853	0.0775	9.14	
		0.0499	0.0491	1.60	
	M4	0.4602	0.4554	1.04	0.84
		0.3351	0.3315	1.07	
		0.2041	0.2033	0.39	
	Oak 740	0.0308	0.0016	94.81	94.89
		0.0218	0.0011	94.95	
		0.0373	0.0019	94.91	
Shopmaster	Oak 15A	0.0558	0.0754	-35.13	-19.63
		0.1061	0.1074	-1.23	
		0.0612	0.075	-22.55	
	Oak 529	0.0191	0.0017	91.11	126.66
		-0.0004	0.0008	300.00	
		-0.0009	-0.001	-11.11	
	Oak 15C	0.1527	0.0965	36.8	42.21
		0.0713	0.0689	3.37	
		0.0502	0.0068	86.45	
	Oak 941-A	0.0362	0.0359	0.83	6.48
		0.0862	0.0776	9.98	
		0.059	0.0539	8.64	
	M4	0.1348	0.1352	-0.30	25.17
		0.1791	0.0423	76.38	

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		0.432	0.4345	-0.58	
	Oak 740	0.0699	0.0174	75.11	81.33
		0.07	0.0123	82.43	
		0.0436	0.0059	86.47	

Micro 90 and Shopmaster were both ineffective at removing lubricating oils from copper substrates. Shopmaster performed better than Micro 90, with percent removals of 43.70% and 27.44%, respectively. Visually coupons cleaned with Micro 90 were beginning to oxidize in some areas. According to the technical data sheet, Micro 90 is a compatible cleaner for copper alloys. However, fear of damage to coupons or parts eliminates Micro 90 as an option for an alternative cleaner.

The pictures below show two coupons cleaned with Micro 90, that were beginning to show spots of oxidation.

Summary:

Substrates:	Copper				
Contaminants:	Lubricating/Lapping Oils				
Company Name:	**Product Name:**	**Conc.:**	**Efficiency:**	**Effective:**	**Observations:**
International Products Corporation	Micro 90 Conc.	2	27.44	☐	
Buckeye International	Shopmaster FF	5	43.70	☐	

Conclusion:

Micro 90 and Shopmaster were ineffective at removing lubricating oils from copper substrates when immersed in diluted solution, at room temperature, for five minutes. Future testing will include Shopmaster, but it will not include Micro 90 due to it oxidizing the coupons.