CLEANING LABORATORY EVALUATION SUMMARY

SCL #:	2019
DateRun:	07/28/2019
Experimenters:	Nicole Kebler, Julie Nguyen
ClientType:	Electroplating Company
ProjectNumber:	Project #1
Substrates:	Copper
PartType:	Coupon
Contaminants:	Lubricating/Lapping Oils, Oil
Cleaning Methods:	Immersion/Soak
Analytical Methods:	Gravimetric, Visual
Purpose:	To evaluate six cleaning products for Rustlick 50/50 removal from copper coupons.
Experimental Procedure:	Three pre-weighed copper coupons were used for each cleaner. The coupons were soiled halfway on one side using a hand-held swab before dirty weights were recorded. Dilutions and temperature for each cleaner was based on vendor recommendations. Coupons were immersed three at a time for 15 minutes, and visual observations were recorded every five minutes. Cleaned coupons were rinsed in heated (95^{o} F) tap water for five minutes, air dried for five minutes with a heat gun, and then final weights were recorded.

Results:

Cleaner	Initial wt. of cont.	Final wt. cont.	% Cont. Removed	Average
1	0.1138	0.0025	97.80	99.03
	0.0825	0.0002	99.76	
	0.0890	0.0004	99.55	
2	0.0550	0.0000	100.00	99.26
	0.0825	0.0006	99.27	
	0.0946	0.0014	98.52	
3	0.0506	0.0014	97.23	97.53
	0.0560	0.0010	98.21	
	0.0662	0.0019	97.13	
4	0.0867	0.0030	96.54	98.24
	0.1318	0.0011	99.16	
	0.0906	0.0009	99.01	
5	0.0924	0.0039	95.78	94.65
	0.0827	0.0050	93.95	
	0.0779	0.0045	94.22	
6	0.0773	0.0025	96.76	97.83
	0.0867	0.0007	99.19	
	0.0771	0.0019	97.54	

Visual Observations

Cleaner	5 Mins	10 Mins	15 Mins	Rinse
1	- immediate removal of all thin layer of soil -tiny clear bubbles forming - most soil removed before 5 min mark	- water turned slightly blue - some tiny clear bubbles on coupon	- water is slightly blue + cloudy - coupon looks clean - slight chemical smell	- coupon looks to be clean - dilution is clear
2				

CLEANING LABORATORY EVALUATION SUMMARY

	- too cloudy to see	- water clearing up - most soil looks to be removed - very small amount of tiny clear bubbles	- coupon looks clean - water is clear	- coupon looks to be clean - dilution is clear
3	- soil immediately turned pale blue - removing thin layers of soil before 5 mins - very thick layer of soils not removed	- thicker layers of soil slowly being removed - clear tiny bubbles visible on coupon	- water turning slightly cloudy + blue - lots of tiny clear bubbles	- coupon looks to be clean - dilution is clear
4	- soil immediately coming off - blue swirls (due to agitation) visible - swirls moving to top of water	- water slightly turning blue - tiny clear bubbles visible on coupon - thicker layer of soil still remain on coupon	- very little soil still on coupon - flakes of soil floating at top - water turning cloudy + blue	- coupon looks to be clean - dilution is clear
5	- soil immediately turned pale blue - soil forming swirls (due to agitation)	- thick layer of soil still remain - water getting cloudy - some soil still on coupon	- coupons look fairly clean before 15 min mark	- coupon looks to be clean - dilution is clear

CLEANING LABORATORY EVALUATION SUMMARY

6	- immediate blue swirls (soil coming off) - water getting slightly cloudy	- some soil rising to top - very thin blue rim at top of water	- water slightly cloudy - coupon looks fairly clean - tiny clear bubbles on coupon	- coupon looks to be clean - dilution is clear

Summary:

Substrates:	Copper				
Contaminants:	Lubricating/Lapping Oils, Oil				
Company Name:	**Product Name:**	**Conc.:**	**Efficiency:**	**Effective:**	**Observations:**
Brulin Corporation	Aquavantage 1400	5%	99.03	☑	
Hubbard Hall Inc	Emerald HD2	15%	99.26	☑	
Alconox Inc	Alconox	1%	97.53	☑	
International Products Corporation	Micro 90 Conc.	2%	98.24	☑	
Alconox Inc	Liquinox	1%	94.65	☑	
Buckeye International	Immersion Cleaner	20%	97.83	☑	

Conclusion:

All six cleaners were effective at removing Rustlick 50/50 from copper coupons. Next step would be to pick the top four best performing cleaners to test on dirty parts provided by Barry Industries.