

# CLEANING LABORATORY EVALUATION SUMMARY

SCL #: 2019  
 DateRun: 07/29/2019  
 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° 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

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2	<ul style="list-style-type: none"> <li>- too cloudy to see</li> </ul>	<ul style="list-style-type: none"> <li>- water clearing up</li> <li>- most soil looks to be removed</li> <li>- very small amount of tiny clear bubbles</li> </ul>	<ul style="list-style-type: none"> <li>- coupon looks clean</li> <li>- water is clear</li> </ul>	<ul style="list-style-type: none"> <li>- coupon looks to be clean</li> <li>- dilution is clear</li> </ul>
3	<ul style="list-style-type: none"> <li>- soil immediately turned pale blue</li> <li>- removing thin layers of soil before 5 mins</li> <li>- very thick layer of soils not removed</li> </ul>	<ul style="list-style-type: none"> <li>- thicker layers of soil slowly being removed</li> <li>- clear tiny bubbles visible on coupon</li> </ul>	<ul style="list-style-type: none"> <li>- water turning slightly cloudy + blue</li> <li>- lots of tiny clear bubbles</li> </ul>	<ul style="list-style-type: none"> <li>- coupon looks to be clean</li> <li>- dilution is clear</li> </ul>
4	<ul style="list-style-type: none"> <li>- soil immediately coming off</li> <li>- blue swirls (due to agitation) visible</li> <li>- swirls moving to top of water</li> </ul>	<ul style="list-style-type: none"> <li>- water slightly turning blue</li> <li>- tiny clear bubbles visible on coupon</li> <li>- thicker layer of soil still remain on coupon</li> </ul>	<ul style="list-style-type: none"> <li>- very little soil still on coupon</li> <li>- flakes of soil floating at top</li> <li>- water turning cloudy + blue</li> </ul>	<ul style="list-style-type: none"> <li>- coupon looks to be clean</li> <li>- dilution is clear</li> </ul>
5	<ul style="list-style-type: none"> <li>- soil immediately turned pale blue</li> <li>- soil forming swirls (due to agitation)</li> </ul>	<ul style="list-style-type: none"> <li>- thick layer of soil still remain</li> <li>- water getting cloudy</li> <li>- some soil still on coupon</li> </ul>	<ul style="list-style-type: none"> <li>- coupons look fairly clean before 15 min mark</li> </ul>	<ul style="list-style-type: none"> <li>- coupon looks to be clean</li> <li>- dilution is clear</li> </ul>
6	<ul style="list-style-type: none"> <li>- immediate blue swirls (soil coming off)</li> <li>- water getting slightly cloudy</li> </ul>	<ul style="list-style-type: none"> <li>- some soil rising to top</li> <li>- very thin blue rim at top of water</li> </ul>	<ul style="list-style-type: none"> <li>- water slightly cloudy</li> <li>- coupon looks fairly clean</li> <li>- tiny clear bubbles on coupon</li> </ul>	<ul style="list-style-type: none"> <li>- coupon looks to be clean</li> <li>- dilution is clear</li> </ul>

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Summary:

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

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.