

# CLEANING LABORATORY EVALUATION SUMMARY

SCL #: 2023  
 DateRun: 04/13/2023  
 Experimenters: Amelia Wagner  
 ClientType: Lab  
 ProjectNumber: Project #8  
 Substrates: Stainless Steel  
 PartType: Coupon  
 Contaminants: Greases, Lubricating/Lapping Oils  
 Cleaning Methods: Ultrasonics  
 Analytical Methods: Gravimetric  
 Purpose: To evaluate the effectiveness of SB-16 (a FAME + Methyl Lactate mixture) in removing several production oils and greases from stainless steel coupons as a potential replacement for TCE using heated ultrasonics cleaning method.

Experimental Procedure: Three stainless steel coupons were used for each of the five soils being tested for a total of 15 coupons. The initial weights of each coupon were recorded. The bottom third of every coupon was soiled by applying the corresponding soil with a swab. The dirty weights of each coupon were then recorded. The coupons were then subjected to heated ultrasonics cleaning in a solution of Fatty Acid Methyl Ester 93% + Ethyl Lactate 7% for 15 minutes at 130 F. After the coupons were cleaned, they dried with a heat gun for about 2 minutes each. The next morning, the clean weights of each coupon were taken

| Soil                         | Use                        | CAS                                  |
|------------------------------|----------------------------|--------------------------------------|
| Milform OAK 7a International | Stamping and drawing fluid | 64742-53-6 / 68909-65-9              |
| Milform Oak 529              | Evaporative lubricant      | 68551-17-7 / 123-95-5 / 127087-87-0  |
| Milform Oak 15a              | Metalworking oil           | 64742-44-5 / 64742-52-5 / 64742-55-8 |
| Milform Oak 15c              | Metalworking oil           | 64742-52-5 / 64742-53-6              |
| M4                           |                            |                                      |

Results:

| Solvent  | Substrate       | Soil                 | Initial wt of cont. | Final wt of cont. | %Cont Removed | % AVG | % Overall |
|--|-----------------|----------------------|---------------------|-------------------|---------------|-------|-----------|
| Fatty Acid methyl ester 93% + Ethyl lactate 7% | Stainless Steel | Oak 7a international | 0.0753              | 0.0308            | 59.10         | 67.74 | 72.69     |
|  |                 | Oak 7a international | 0.0635              | 0.0202            | 68.19         |       |           |
|  |                 | Oak 7a international | 0.0781              | 0.0188            | 75.93         |       |           |
|  |                 | M4                   | 0.1500              | 0.0254            | 83.07         | 82.94 |           |
|  |                 | M4                   | 0.2122              | 0.0416            | 80.40         |       |           |
|  |                 | M4                   | 0.1380              | 0.0202            | 85.36         |       |           |
|  |                 | Oak 15C              | 0.0709              | 0.0118            | 83.35         | 80.84 |           |
|  |                 | Oak 15C              | 0.0775              | 0.0154            | 80.13         |       |           |
|  |                 | Oak 15C              | 0.1068              | 0.0224            | 79.03         |       |           |
|  |                 | Oak 15A              | 0.1911              | 0.0158            | 91.73         | 87.13 |           |
|  |                 | Oak 15A              | 0.1891              | 0.0244            | 87.10         |       |           |
|  |                 | Oak 15A              | 0.1571              | 0.0274            | 82.56         |       |           |
|  |                 | Oak 529              | 0.0273              | 0.0152            | 44.32         | 44.80 |           |
|  |                 | Oak 529              | 0.0309              | 0.0231            | 25.24         |       |           |
| Oak 529  | 0.0330          | 0.0116               | 64.85               |                   |               |       |           |

When the coupons were dried with a heat gun for 2 minutes each, a white vapor was emitted in the fume hood.

Summary:

|                    |                 |
|--------------------|-----------------|
| <b>Substrates:</b> | Stainless Steel |
|--------------------|-----------------|

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| <b>Contaminants:</b> |                      | Greases, Lubricating/Lapping Oils |                    |                                     |                      |
|----------------------|----------------------|-----------------------------------|--------------------|-------------------------------------|----------------------|
| <b>Company Name:</b> | <b>Product Name:</b> | <b>Conc.:</b>                     | <b>Efficiency:</b> | <b>Effective:</b>                   | <b>Observations:</b> |
| TURI Cleaning lab    | SB-16                |                                   | 68.00              | <input type="checkbox"/>            | on soil Oak 7A       |
| TURI Cleaning lab    | SB-16                |                                   | 83.00              | <input checked="" type="checkbox"/> | on soil M4           |
| TURI Cleaning lab    | SB-16                |                                   | 80.00              | <input checked="" type="checkbox"/> | on soil Oak 15 C     |
| TURI Cleaning lab    | SB-16                |                                   | 87.00              | <input checked="" type="checkbox"/> | on soil Oak 15 A     |
| TURI Cleaning lab    | SB-16                |                                   | 45.00              | <input type="checkbox"/>            | on soil Oak 529      |

**Conclusion:**

SB-16 (Fatty Acid Methyl Ester 93% + Ethyl Lactate 7%) is an effective cleaner for soils M4, Oak 15C, and Oak 15a if a drying step is feasible. It is not an effective cleaner for soils Oak 7a international and Oak 529.