

CLEANING LABORATORY EVALUATION SUMMARY

SCL #: 1999

DateRun: 05/25/1999

Experimenters: Jason Marshall

ClientType: Department of Public Works

ProjectNumber: Project #1

Substrates: Steel

PartType: Coupon

Contaminants: Cutting/Tapping Fluids, Lubricating/Lapping Oils, Oil

Cleaning Methods: Immersion/Soak

Analytical Methods: Gravimetric

Purpose: To evaluate selected cleaners for the removal of specified CAS#s.

Experimental Procedure: Table 1 lists the contaminants used by the client.

Table 1. Contaminant Listings

| CAS Removal Search | Sources of Contaminants at SCL (Listed by SCL heading) | | | | | | | |
|--------------------|--|--------|--------|--------|--------|--------|--------|--------|
| Total | Cleaned Before | | | | | | | |
| CAS # | CAS # | | | | | | | |
| 108-88-3 | 108-88-3 | 95-416 | 96-418 | 96-419 | 97-541 | 98-541 | 98-571 | 98-680 |
| 3159-62-4 | | | | | | | | 99-622 |
| | | | | | | | | |
| 64741-88-4 | 64741-88-4 | 98-679 | 98-561 | | | | | |
| | | | | | | | | |
| 64742-01-4 | 64742-01-4 | 98-679 | | | | | | |
| | | | | | | | | |
| 64742-53-6 | 64742-53-6 | | | 99-695 | 99-688 | 97-549 | 95-406 | 96-449 |
| | | | | | | | | |
| 64742-54-7 | 64742-54-7 | 98-679 | 98-561 | 99-695 | 99-692 | | | |
| | | | | | | | | |
| 64742-57-0 | 64742-57-0 | 98-679 | | 99-695 | | | | |
| | | | | | | | | |
| 64742-62-7 | 64742-62-7 | 98-679 | 98-561 | | 95-406 | | | |
| | | | | | | | | |
| 64742-65-0 | 64742-65-0 | 98-679 | 98-561 | | | | | |
| 68649-01-4 | | | | | | | | |
| | | | | | | | | |
| 72623-87-1 | 72623-87-1 | 98-679 | | | | | | |
| 8032-32-4 | | | | | | | | |
| 98-679 | Castrol Motor Oil | | | | | | | |
| 99-695 | W.A. Wood Oil | | | | | | | |

The eight chemistries used in the cleaning trial were selected based on results obtained from the SCL Effective Tests Conditions database and the Industrial Cleaning Survey: Directory of Vendors Tech Report # 15. Table 2 lists the ETC results

Table 2. ETC Search Results Based on CAS#.

| Products Used to Remove Contaminants | | | | | | | | |
|--------------------------------------|------------------|------------------|------------|------------------|------------------|------------------|------------|------------|
| 108-88-3 | 64741-88-4 | 64742-01-4 | 64742-53-6 | 64742-54-7 | 64742-62-7 | 64742-65-0 | 64742-57-0 | 72623-87-1 |
| AG Environmental | WR Grace | WR Grace | EMKAY | WR Grace | WR Grace | WR Grace | EMKAY | WR Grace |
| | Safe CleanUp | Safe CleanUp | | Safe CleanUp | Safe CleanUp | Safe CleanUp | | |
| | AG Environmental | AG Environmental | | AG Environmental | AG Environmental | AG Environmental | | |
| | | | | EMKAY | | | | |

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Table 3 lists all cleaners selected and the concentrations used. The chemistries were diluted to the listed amounts in 400 mL beakers using DI water. The beakers were heated to 130 F (except Envirosolutions-room temp) on a hot plate.

Twenty-four preweighed coupons were contaminated with the mixture of the two oils and weighed again. Three coupons were cleaned in each beaker for five minutes using stir-bar-agitation. Coupons were rinsed in tap water at 120 F for 30 seconds and dried using a Master Appliance Corp, Hot-air gun model HG at 500 F for one minute. After the coupons cooled to room temperature, the final clean weights were recorded and cleaning efficiencies were calculated.

SUBSTRATE MATERIAL: Steel Coupons (202-1010-B79)

CONTAMINANTS: Oil: W.A Wood Co W-373 (CAS #s 64741-44-2, 64742-53-6, 64742-52-5); Castrol GTX Motor Oil SAE 10W-40 (CAS #s 64742-41-2, 64741-88-4, 64742-01-4, 64742-46-7, 64742-54-7, 64742-56-9, 64742-57-0, 64742-62-7, 64742-65-0, 72623-83-7, 72623-84-8, 72623-85-9, 72623-86-0, 72623-87-1)

CONTAMINATING PROCESS USED: The two oils were mixed together, using more of the Castrol oil. The mixed oil was then brushed onto coupons using a hand-held swab.

Results:

Three of the cleaners were capable of removing >90% of the contaminant, and only one product cleaned less than 70% of the contaminant from the coupons using stir-bar agitation. Envirosolutions was the most efficient cleaner removing nearly 100% of the oil mixture.

Table 4. Cleaning Efficiencies

| | 282 GF | Safety Wash | Super Neutral | 7300 | Solsafe 245 | Soy Gold 2000 | Micro 90 | SC A&MC |
|-------------|-----------|----------------|------------------|-------|----------------|---------------------|-------------|------------|
| Coupon 1 | 78.27 | 72.79 | 92.7 | 40.48 | 99.69 | 86.86 | 81.61 | 97.47 |
| Coupon 2 | 81.63 | 70.84 | 94.03 | 14.14 | 99.23 | 90.21 | 69.54 | 88.18 |
| Coupon 3 | 84.15 | 66.91 | 92.14 | 47.06 | 99.82 | 86.75 | 67.91 | 93.28 |
| Ave | 81.35 | 70.18 | 92.96 | 33.89 | 99.58 | 87.94 | 73.02 | 92.98 |
| Std Dev | 2.95 | 2.99 | 0.97 | 17.42 | 0.31 | 1.97 | 7.49 | 4.65 |

Summary:

| Substrates: | | Steel | | | | |
|------------------------------------|--|---|--------|-------------|-------------------------------------|---------------|
| Contaminants: | | Cutting/Tapping Fluids, Lubricating/Lapping Oils, Oil | | | | |
| Company Name: | | Product Name: | Conc.: | Efficiency: | Effective: | Observations: |
| Magnaflux | | Daraclean 282 GF | 5 | 81.35 | <input type="checkbox"/> | |
| Emkay Chemical Company | | Safety Wash | 5 | 70.18 | <input type="checkbox"/> | |
| Safe CleanUp Solutions | | Super Neutral | 10 | 92.96 | <input checked="" type="checkbox"/> | |
| Watson Technical Associates | | Watson Formula 7300 | 5 | 33.89 | <input type="checkbox"/> | |
| Bio Chem Systems | | Solsafe 245 | 100 | 99.58 | <input checked="" type="checkbox"/> | |
| AG Environmental Products | | Soy Gold 2000 | 50 | 87.94 | <input checked="" type="checkbox"/> | |
| International Products Corporation | | Micro 90 Conc. | 5 | 73.02 | <input type="checkbox"/> | |
| Gemtek Products | | SC Aircraft & Metal Cleaner Super Concentrate | 5 | 92.98 | <input checked="" type="checkbox"/> | |

Conclusion:

Increasing the concentrations of the products which cleaned less than 90% should increase the efficiencies. Additional testing could be performed to determine the optimum concentrations for cleaning nearly 100% of the contaminant from the coupons.
The Watson product will not be tested any further due to its limited success in removing the oil mixture.