

UNMARKED QINETIQ PROPRIETARY

# Assessment of Chromate-Free Alternatives as Paint Primers

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## Aircraft Performance

- Operating Environment

Extreme temperatures: -70° to +55 ° C

Marine hot; Marine cold

Atmospheric pressure, wind, ozone, sand, dust, pollutants, ice and snow loading

Fluid contamination

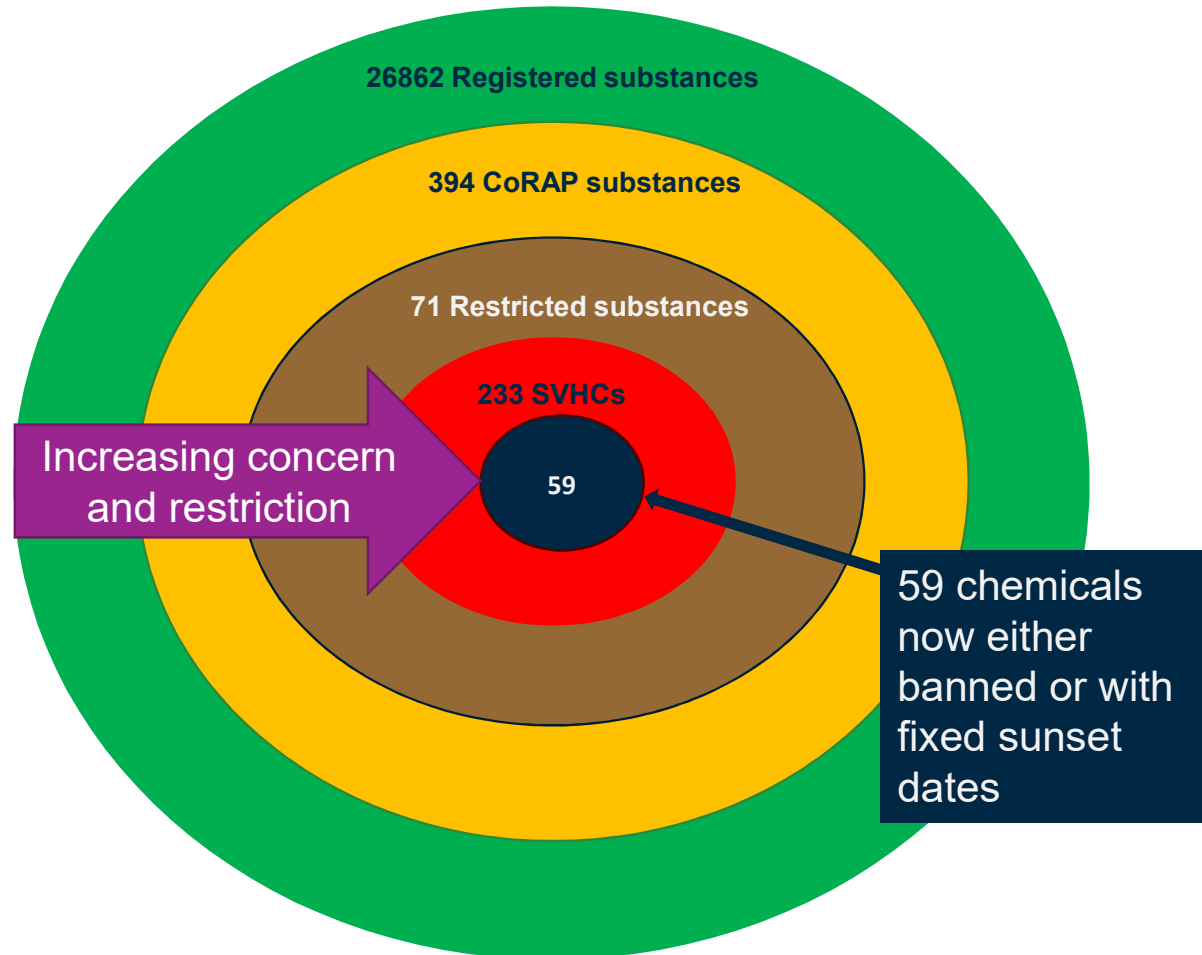
- Aircraft construction – mainly aluminium and composite structures

- Paints or surface coatings are required to protect the aircraft (new and ageing aircraft)

Exterior/interior of aircraft – Primer and Top-coat

(Film thickness: ~70 - 100µm thick)

# REACH categories for chemicals (under continual revision)



## REACH - Implications

- 17 Chromate substances (SVHCs)
- Authorisation (17 chromate-related substances on the UK List)
- Sunset dates
- Strontium Chromate (CAS: 7789-06-02, EC: 232-142-6)
- Pentazinc chromate octahydroxide (CAS: 49663-84-5, EC: 256-418-0)
- BS X 32 (Pre-treatment etch primer)
- BS X 33 (Primer)
- Authorisation period – time limited
- Alternatives to be actively sought

## Evaluation of Alternatives – Work Programme

- Tests specified in BS X 32, BS X 33 and BS X 34 - useful for studying the behaviour of alternatives
- Metallic substrates
- Pre-treatment – chromate containing (standardised) on BS L 163 (2014-T3) aluminium alloy
- 2024-T3 and 7075-T6 aluminium alloys
- Pre-treatments – abrasion, sol-gel and chromate-free conversion coating (commercially available)
- Coatings – chromate containing primer, 2 chromate-free primers (commercially available)
- Polyurethane top-coat (where required)
- A new national standard – chromate-free primer

## Work Programme - Tests

- VOCs
- Application properties
- Colour and Gloss
- Flexibility – Cupping, bend and impact
- Cross-cut – Adhesion
- Water, hydraulic fluid resistance
- Corrosion – Neutral Salt spray (continuous hot/wet), Cyclic (wet/dry and acidic), Alternate Immersion/Emersion, Filiform
- Durability – Artificial weathering, Natural weathering



## Results/Conclusions - Summary

	Control			Chromate-free (1)			Chromate-free (2)		
	None	1	2	None	1	2	None	1	2
<b>Pre-treatment</b>	None	1	2	None	1	2	None	1	2
<b>Adhesion/Hardness</b>	√√	√√	√√	√√	√√	√	√√	√√	√
<b>Flexibility</b>	√	√	√√	√√	√	√	√	√	√√
<b>Water Resistance</b>	√√	√√	√√	√	√	√	√	√	√
<b>Fluid Resistance</b>	√√	√	√	√	√	√	√	√	√
<b>Neutral Salt Spray</b>	√√	√	√	√√	√√	√√	√√	√	√
<b>Alternate Immersion</b>	√√	√√	√√	√	√	√	√	√	√
<b>ASTM G85</b>	√√	√√	√√	√	√	√	√	√	√
<b>Filiform</b>	√	√	√	√√	√√	√√	√√	√√	√√
<b>Artificial Weathering</b>	√	N/A	N/A	√√	N/A	N/A	√	N/A	N/A

√ - performance indicator. N/A – Not Applicable

## Recommendations

- Discuss results with paint suppliers
- Aircraft trials
- A new national standard drafted

# Questions?

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