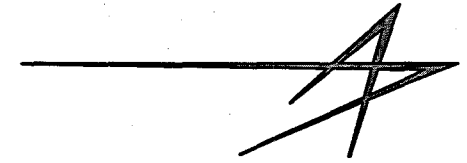
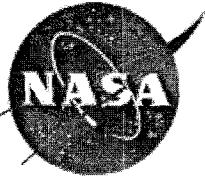


ABSTRACT

Title: ET Toxic Metals Replacement Review SEA Spring Face to Face

Author: Earl Pratz

The information contained in the presentation covers development work carried out under SDS projects. The intent of the effort is to find chrome(VI) free alternates to our current chromated processing solutions. The information presented reports progress in work aimed to replace our alkaline cleaner (Turco 4215), conversion coat (Iridite 14-2) and chrome (VI) compounds used in LOx tank hydrostatic proof test solution. To date we have found candidates for use in the proof test solution and alkaline cleaner. These candidates are in the final stages of testing. Lab data is reported in the presentation.

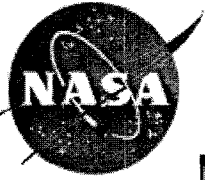


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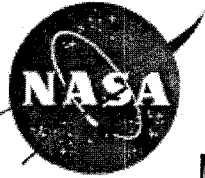
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Current project covers three tasks

- Conversion coat (Iridite 14-2) alternate
- Alkaline cleaner replacement
- LOx hydrostatic proof solution chromium elimination



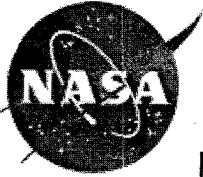
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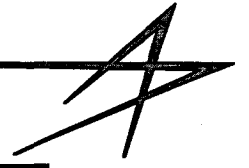
Conversion Coat Replacement :

- Metalast International, Inc, supplies Metalast TCP-HF
Metalast tested on AA 2024 test panels in 336 hr salt spray testing (MIL-C- 5541)
 - Application process
 - Solution concentration, 50% v/v (new 25%)
 - Gentle agitation for 3 min at ambient temp (new 5 min)
 - Three min. DM water rinse
 - Timed drying – 24 hrs @ 58 C
 - New Metalast lot failed due to significant differences in application
 - XPS analysis of panels subjected to 168 and 336 hrs of salt spray.



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Alkaline Cleaner Replacement

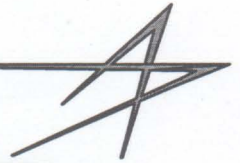
Four soils on panels – three oils, one tape residue

- Spray Study – Week 1
 - Pilot spray used AN920L Defoamer at a 1.5% addition (1.5g of AN920L Defoamer to 100g of AN100).
 - Four panels were processed; all water break free.
 - Excessive foaming was observed.
- Spray Study – Week 2
 - Increased AN920L Defoamer concentration to 3.0%.
 - Increased solution temperature from 120°F to 130°F.
 - Significant foam reduction.
 - Four panels were processed with all water break free.
 - Turco 4215 run side by side to compare foam with the AN100 tank.



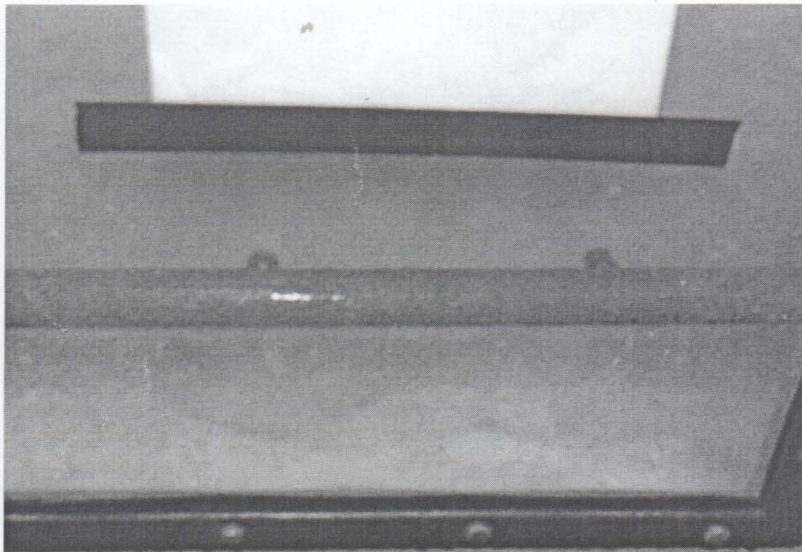
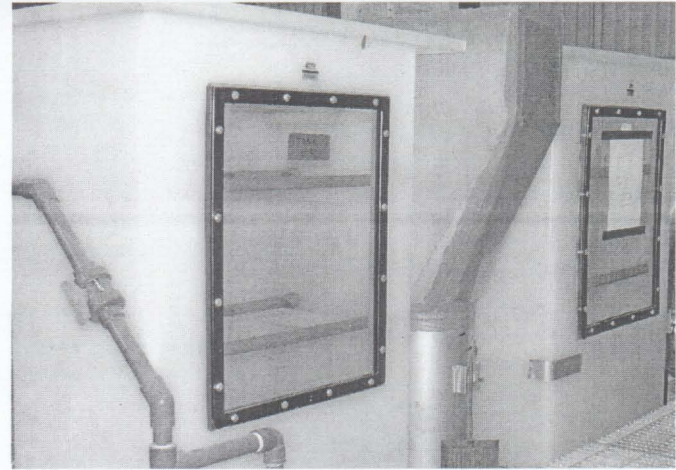
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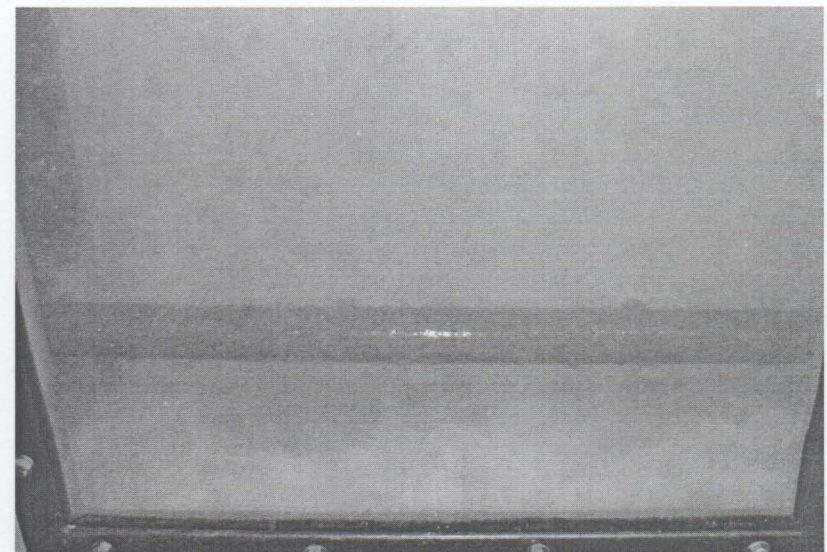


Alkaline Cleaner Replacement

AN 100 Spray Tanks →



AN100 Spray Tank During Wash



Turco 4215 Spray Tank During Wash

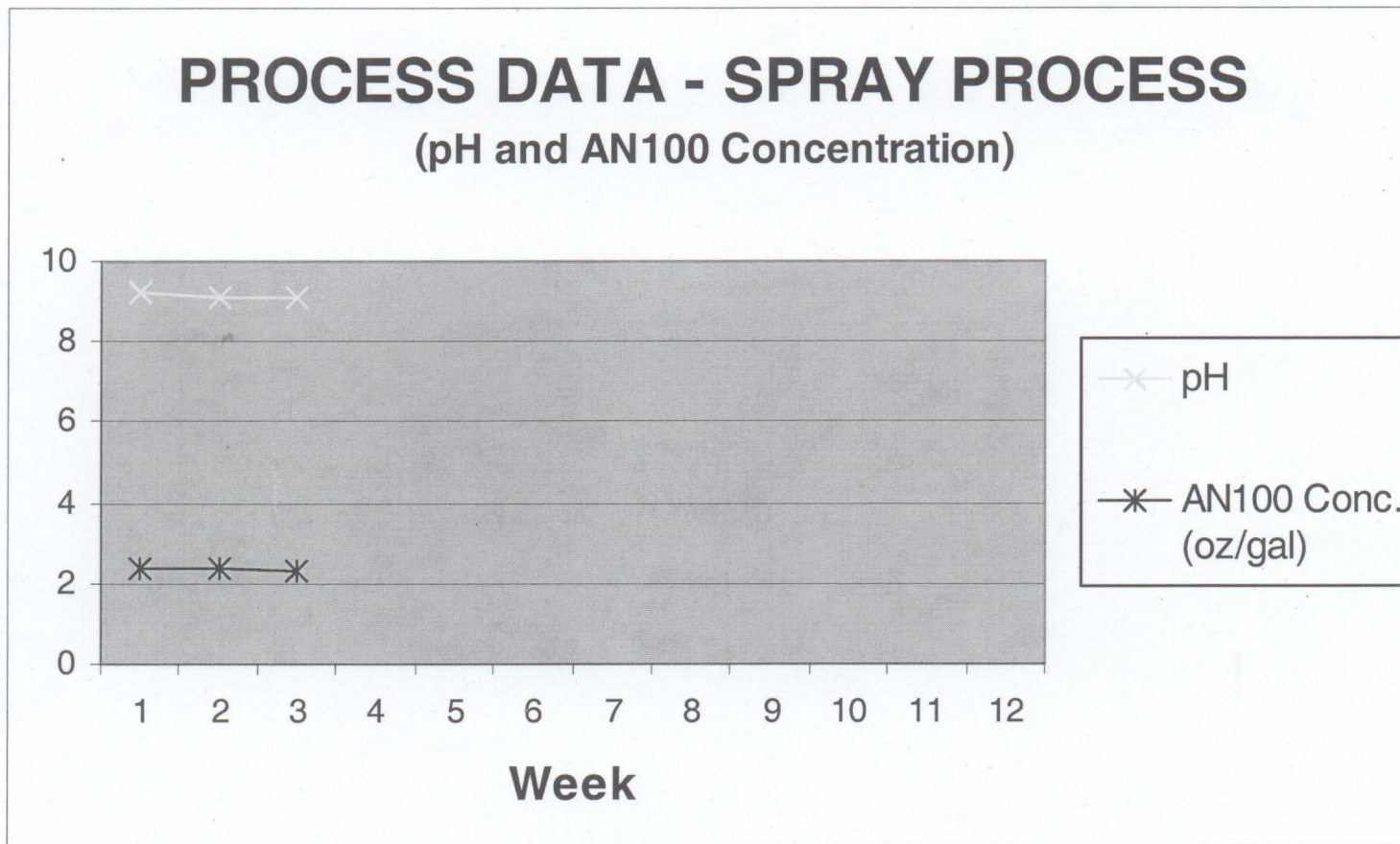


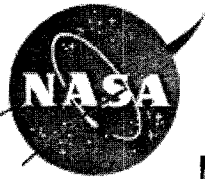
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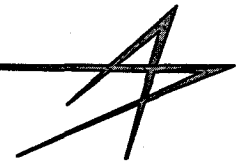
Alkaline Cleaner Replacement





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Chromium Replacement in LOx Tank Proof Test Solution

- Initiated database search for applicable inhibitor products
 - Search was completed and review of search is underway.
 - Several potential candidates were suggested
- Engineering test plan has been proposed to test for corrosion inhibition
 - Planned preliminary screening test to address test plan parameters
 - Meet with Production Operations to verify Cell F time line