



EPA Region 8 Environmental Excellence Award for Hill AFB
March 5, 2004

Because of the persistence of a few mavericks at Hill Air Force Base (Ogden, Utah), the US Air Force is now close to service-wide elimination of chromic acid in its aircraft painting operations. It took eight years overcoming obstacles in the form of nay-sayers, out-dated specs, skeptical bureaucrats and extensive testing. Hill Air Force Base led the way by boldly thinking outside the box with an eye toward breakthrough results rather than mere compliance.

Hill Air Force Base is an Air Force Materiel Command base, and is home to many operational and support missions, with the Ogden Air Logistics Center (OO-ALC) serving as the host organization. The center provides worldwide engineering and logistics management for the F-16 Fighting Falcon, A-10 Thunderbolt, Minuteman III and Peacekeeper intercontinental ballistic missiles. The base performs depot maintenance of the F-16, A-10 and C-130 Hercules aircraft.

In 1996, the Science and Engineering Laboratories at Hill Air Force Base received Pollution Prevention funding to evaluate non-chromated replacements for hexavalent chromium used in the pre-treatment of aircraft. The goal was to eliminate exposure of highly soluble and carcinogenic concentrations of chromic acid to workers and the Air Force Base's environmental community.

The laboratories, led by Senior Materials Engineer Richard Buchi, did extensive research and screening of various alternatives. None of the options worked. Rather than give up, the technical staff took an "outside of the box" approach. Instead of looking at surface pretreatments alone, they took a *systems* approach considering surface pretreatment, primer, and topcoat together as a system. Doing so yielded three key insights:

- Total hexavalent chromium on the aircraft can be reduced while actually improving coating life cycle performance.
- The largest toxic waste stream from aircraft painting comes from the chromate conversion coating process due to the amount of tainted rinse water that is produced.
- By insuring that the primer adheres tighter and longer to the substrate in all environmental conditions, corrosion protection is enhanced and field maintenance is reduced.

The success of the systems approach in laboratory testing led Buchi's group to identify new technology that would increase adhesion without using hexavalent chromium. Field trials of several aircraft using this new technology eventually led to the complete replacement of chromic acid conversion coating on all F-16s at Hill AFB. Still, Buchi encountered skepticism and resistance to his systems approach, primarily because the existing paint specification was written around chromated surface pre-treatments (Tech Order 1-1-8). Buchi's group worked with the Air Force Corrosion office, the EPA and the private sector (manufacturers of the new technology) to update the existing paint specification to include a "systems" approach – opening the door to broad Air Force-wide adoption of the systems approach.

As a result, the USAF Corrosion Program and Control Office at Warner Robins AFB will incorporate this process and surface pretreatment material into Technical Order 1-1-8 Application and Removal of Organic Coatings, Aerospace and Non-Aerospace Equipment (the critical Air Force-wide spec) after sponsoring and monitoring the in-field results of their test program. The Coatings Technology Integration Office has tested the materials and processes and technologically validated all of Hill AFB's work. The US Environmental Protection Agency also supported the use of the pretreatment material by issuing a national determination stating that its use does not trigger Categorical Industrial User status under 40CFR433.

The non-chromate technology is deployed on over 1500 US Air Force Aircraft. The Air Education Training Command (AETC) mandated replacement of chromic acid conversion coats on T-37, T-38, and T-1 aircraft. System Program Offices for A-10s, C-130s, KC-135s, B-52s, B-1B aircraft are actively investigating the use of the systems approach that Hill AFB pioneered.

After eight years of Hill AFB effort to change the paradigm of how aircraft are painted, the USAF is close to service wide elimination of chromic acid in its aircraft painting operations. The hard work is paying off:

1. Exponential reduction in worker exposure to toxic materials (workers no longer need full chemical suits and respirators)
2. Dramatically improved waste streams
3. Lowering of overall process cost upon implementation
4. Proof that environmental concerns can be addressed without sacrificing performance and protection of our nation's assets and security.

Richard Buchi's push to create a safer and better painting process is a big pollution prevention success story that is worthy of recognition.