

## Key Performance Advantages

- Minimizes cobalt leaching
- Enhances the performance of triazine biocides
- Efficient neutralizer



Metalworking Fluids

# CORRGUARD<sup>®</sup>-95

## The Key Building Block for Low Cobalt-Leaching Metalworking Fluids

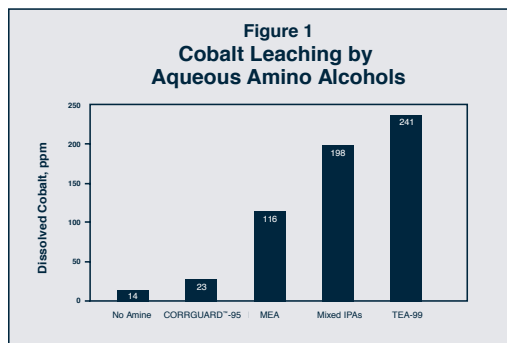
Cemented tungsten-carbide tooling is widely used for the machining of hard metals. The “cement” which holds the tool together is a cobalt binder. If the metalworking fluid (MWF) used by the carbide tool manufacturer dissolves cobalt, the following problems may occur:

- Dermatitis in workers handling fluids containing dissolved cobalt
- Inhalation of coolant mist containing dissolved cobalt
- Waste disposal problems due to cobalt content in used fluids

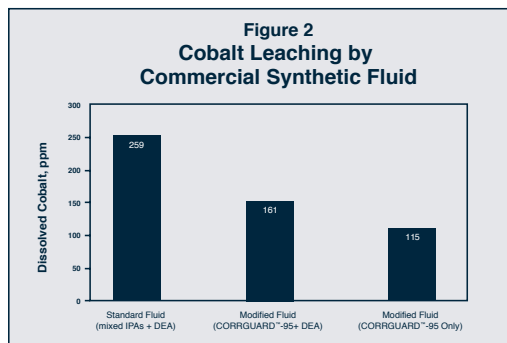
One way of controlling cobalt leaching is to include inhibitors, such as triazoles, in the metalworking fluid formula. While this approach is effective initially, the inhibitor can be depleted as the fluid is used, necessitating possible tank-side inhibitor treatment. This is inconvenient and can increase operating costs.

The best solution is to build a fluid formulation that does not leach cobalt. One of the major culprits contributing to cobalt leaching in metalworking fluids can be amino alcohols. However, these products vary widely in their tendency to leach cobalt. Studies in the research laboratories of ANGUS Chemical Company have shown that there is minimal leaching of cobalt demonstrated with CORRGUARD<sup>®</sup>-95 Amino Alcohol, and it is an excellent commercial amine for use in metalworking fluids.

Cobalt-leaching results for 1% aqueous solutions of commonly used amino alcohols are shown in Figure 1. The solutions were circulated for five days with carbide swarf obtained from a tool manufacturer; this test has given good correlation with field results. The final solutions were filtered and analyzed for dissolved cobalt by atomic absorption. The CORRGUARD-95 solution leached only slightly more cobalt than deionized water with no amine. The solutions of monoethanolamine (MEA), mixed isopropanolamines (Mixed IPAs), and triethanolamine (TEA-99) leached significantly more cobalt than the CORRGUARD-95 solution.



Building a metalworking fluid formulation with CORRGUARD-95 Amino Alcohol as the sole amino alcohol results in a fluid which inherently leaches minimal cobalt. A commercial synthetic fluid was tested to compare the cobalt-leaching properties of the standard fluid with an identical fluid containing only CORRGUARD-95. The results are shown in Figure 2. The "standard" fluid contained Mixed IPAs and diethanolamine (DEA). When the IPAs were replaced with CORRGUARD-95, cobalt leaching was reduced by 100 ppm. **When both IPAs and DEA were replaced with CORRGUARD-95, cobalt leaching was further reduced.**



The amino alcohol of choice for building low cobalt-leaching metalworking fluids is CORRGUARD-95. In addition to low cobalt leaching, CORRGUARD-95 provides the following performance benefits for all types of water-dilutable metalworking fluids:

- Efficient pH development and neutralization of acidic ingredients
- Enhanced performance of triazine biocides
- Stable soluble-oil emulsions at higher pH levels
- Low foam in soluble oils
- Minimal ammonia release
- Control of formaldehyde release (e.g. from other fluids containing triazine biocide)

## Product Stewardship

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