

WEAR METALS				
Metal	Engines	Transmissions	Gears	Hydraulics
Iron (Fe)	Cylinder Liners, Rings, Gears, Crankshaft, Camshaft, Valve Train, Oil Pump Gear, Wrist Pins	Gears, Disks, Housing, Bearings, Brake Bands, Shaft	Gears, Bearings, Shaft, Housing	Rods, Cylinders, Gears
Chrome (Cr)	Rings, Liners, Exhaust Valves, Shaft Plating, Stainless Steel Alloy	Roller Bearings	Roller Bearings	Shaft
Aluminum (Al)	Pistons, Thrust Bearings, Turbo Bearings, Main Bearings (Caterpillar)	Pumps, Thrust Washers	Pumps, Thrust Washers	Bearings, Thrust Plates
Nickel (Ni)	Valve Plating, Steel Alloy from Crankshaft, Camshaft, Gears from Heavy Bunker Type Diesel Fuels	Steel Alloy from Roller Bearings and Shaft	Steel Alloy from Roller Bearings and Shaft	
Copper (Cu)	Lube Coolers, Main and Rod Bearings, Turbo Bearings, Lube Additive	Bushings, Clutch Plates, (Auto/Powershift), Lube Coolers	Bushings, Thrust Plates	Bushings, Thrust Plates, Lube Coolers
Lead (Pb)	Main and Rod Bearings, Bushings, Lead Solder	Bushings (Bronze Alloy), Lube Additive Supplement	Bushings (Bronze Alloy), Grease Contamination	Bushings (Bronze Alloy)
Tin (Sn)	Piston Flashing, Bearing Overlay, Bronze Alloy, Babbit Metal along with Copper and Lead	Bearing Cage Metal	Bearing Cage Metal, Lube Additive	
Cadmium (Cd)	N/A	N/A	N/A	N/A
Silver (Ag)	Wrist Pin Bushings, (EMS's) Silver Solder (from Lube Coolers)	Torrington Needs Bearings (Allison)	N/A	Silver Solder (from Lube Coolers)
Titanium (Ti)	Gas Turbine Bearings/Hub/Blades, Paint (white lead)	N/A	N/A	N/A
Vanadium (V)	From Heavy Bunker Type Diesel Fuels	N/A	N/A	N/A

CONTAMINANT METALS				
Metal	Engines	Transmissions	Gears	Hydraulics
Silicon (Si)	Dirt, Seals and Sealants, Coolant Inhibitor, Lube Additive (15 ppm or less)	Dirt, Seals and Sealants, Coolant Inhibitor, Lube Additive (15 ppm or less)	Dirt, Seals and Sealants, Coolant Inhibitor, Lube Additive (15 ppm or less)	Dirt, Seals and Sealants, Coolant Inhibitor, Lube Additive (15 ppm or less)
Sodium (Na)	Lube Additive, Coolant Inhibitor, Salt Water Contamination, Wash Detergents	Lube Additive, Coolant Inhibitor, Salt Water Contamination, Wash Detergents	Lube Additive, Salt Water Contamination, Airborne Contaminant	Lube Additive, Coolant Inhibitor, Salt Water Contamination, Airborne Contaminant
Potassium (K)	Coolant Inhibitor, Airborne Contaminant	Coolant Inhibitor, Airborne Contaminant	Coolant Inhibitor, Airborne Contaminant	Coolant Inhibitor, Airborne Contaminant

MULTI-SOURCE METALS

Metal	Engines	Transmissions	Gears	Hydraulics
Molybdenum (Mo)	Ring Plating, Lube Additive, Coolant Inhibitor	Lube Additive, Coolant Inhibitor	Lube Additive, Coolant Inhibitor, Grease Additive	Lube Additive, Coolant Inhibitor
Antimony (Sb)	Lube Additive	Lube Additive	Lube Additive	Lube Additive
Manganese (Mn)	Steel Alloy	Steel Alloy	Steel Alloy	Steel Alloy
Lithium (Li)	N/A	Lithium Complex Grease	Lithium Complex Grease	Lithium Complex Grease
Boron (B)	Lube Additive, Coolant Inhibitor	Lube Additive, Coolant Inhibitor	Lube Additive, Coolant Inhibitor	Lube Additive, Coolant Inhibitor

ADDITIVE METALS

Metal	Engines	Transmissions	Gears	Hydraulics
Magnesium (Mg)	Detergent Dispersant Additive, Airborne Contaminant	Detergent Dispersant, Additive, Airborne Contaminant	Detergent Dispersant, Additive, Airborne Contaminant	Detergent Dispersant, Additive, Airborne Contaminant
Calcium (Ca)	Detergent Dispersant, Additive, Airborne Contaminant, Contaminant from Water	Detergent Dispersant, Additive, Airborne Contaminant, Contaminant from Water	Detergent Dispersant, Additive, Airborne Contaminant, Contaminant from Water	Detergent Dispersant, Additive, Airborne Contaminant, Contaminant from Water
Barium (Ba)	Usually an Additive from Synthetic Lubricants	Usually an Additive from Synthetic Lubricants	Usually an Additive from Synthetic Lubricants	Usually an Additive from Synthetic Lubricants
Phosphorus (P)	Anti-Wear Additive (ZDP)	Anti-Wear Additive (ZDP)	Anti-Wear Additive (ZDP), EP Additive (Extreme Pressure)	Anti-Wear Additive (ZDP)
Zinc (Zn)	Anti-Wear Additive (ZDP)	Anti-Wear Additive (ZDP)	Anti-Wear Additive (ZDP)	Anti-Wear Additive (ZDP)