

Massachusetts
Department
of
ENVIRONMENTAL
PROTECTION

Toxics Use Reduction Reporting Instructions Appendices

V. April 2026

Table of Contents

| | |
|---|-----|
| Appendix A: Standard Industrial Classification (SIC) Codes and 2022 North American Industry Classification System (NAICS) Codes Reportable Under the Massachusetts Toxics Use Reduction Act | 3 |
| Appendix B: Guidance for TURA Reporting and Planning for Certain Categories and Chemicals | 87 |
| Rules for Reporting Water Dissociable Nitrate Compounds Category | 87 |
| PBT Chemical and Chemical Category Reporting Thresholds | 88 |
| TURA Higher Hazard Chemicals (1,000 lbs. Threshold) | 89 |
| List of Chemicals for which a State Only Form R/A will be Automatically Generated | 91 |
| Guidance on Reporting Hexavalent Chromium (Cr(VI)) Compounds Use in Combustion and Welding Operations (Higher Hazard Substance, Effective Reporting Year 2012) | 93 |
| Guidance on Reporting Formaldehyde as Higher Hazard Substance (Effective Reporting Year 2012) and Quantifying its Use in Combustion Operations | 100 |
| Guidance on Quantifying Use and Reporting Cyanide Compounds under the Toxics Use Reduction Act | 103 |
| Guidance on Reporting Hydrofluoric Acid as a Higher Hazard Substance Under the Toxics Use Reduction Act | 107 |
| Guidance for Reporting Toluene Diisocyanate (TDI) as a Higher Hazard Substance under TURA | 111 |
| Rules for Reporting the Use of Ammonia and Ammonium Hydroxide under TURA | 112 |
| Guidance for Reporting C1-C4 Halogenated Hydrocarbons/Halocarbons Not Otherwise Listed (C1-C4 NOL) | 115 |
| Guidance for Reporting Per- and Poly-Fluoroalkyl Substances (PFAS) under the Toxics Use Reduction Act (TURA), including Individually Listed PFAS and the Certain PFAS Not Otherwise Listed (NOL) Category | 130 |
| Guidance for TURA Reporting and Planning for Certain Metals and Metal Alloys | 160 |
| Difference in TRI and TURA Reporting of Hydrochloric Acid and Sulfuric Acid | 162 |
| Rules for Reporting Glycol Ethers | 163 |
| Rules for Reporting Specifically Listed Chemicals vs. Chemical Categories | 164 |
| Chemical Category Definitions | 170 |
| Appendix C: Form S, Section 4: Toxics Use by Production Unit | 211 |
| Appendix D: Common Reporting Errors | 236 |
| Appendix E: Questions and Answers | 238 |
| Appendix F: Chemicals that Have Been Delisted Under TURA | 241 |
| Appendix G: Integral Recycling Guidance under TURA | 244 |
| Appendix H: Guidance For Using TURA Production Process Codes | 251 |
| How To Use the Production Process Codes | 253 |
| TURA Production Process Codes Listing by Process Type | 260 |
| TURA Production Process Codes: Alphabetized Listing of Group 1 and 3 | 269 |
| Appendix I: Production Units | 283 |
| Appendix J: Production Unit Guidelines | 285 |
| Introduction | 285 |
| What Is A Production Unit & Why Is It Important? | 285 |
| How Do I Classify My Production Units? | 286 |
| Production Unit(s) & TURA Reporting | 294 |
| Appendix K: Glossary of Terms | 298 |

Appendix A: Standard Industrial Classification (SIC) Codes and 2022 North American Industry Classification System (NAICS) Codes Reportable Under the Massachusetts Toxics Use Reduction Act

| SIC | SIC Title | 2022 NAICS | 2022 NAICS Title |
|------------|--|-------------------|--|
| 1011 | Iron Ores | 212210 | Iron Ore Mining |
| 1021 | Copper Ores | 212230 | Copper, Nickel, Lead, and Zinc Mining |
| 1031 | Lead and Zinc Ores | 212230 | Copper, Nickel, Lead, and Zinc Mining |
| 1041 | Gold Ores | 212220 | Gold Ore and Silver Ore Mining |
| 1044 | Silver Ores | 212220 | Gold Ore and Silver Ore Mining |
| 1061 | Ferroalloy Ores, Except Vanadium | 212230 | Copper, Nickel, Lead, and Zinc Mining |
| 1061 | Ferroalloy Ores, Except Vanadium | 212290 | Other Metal Ore Mining |
| 1081 | Metal Mining Services | 213114 | Support Activities for Metal Mining |
| 1081 | Metal Mining Services | 238910 | Site Preparation Contractors |
| 1081 | Metal Mining Services | 541360 | Geophysical Surveying and Mapping Services |
| 1094 | Uranium-radium-vanadium Ores | 212290 | Other Metal Ore Mining |
| 1099 | Metal Ores, Nec | 212290 | Other Metal Ore Mining |
| 1221 | Bituminous Coal and Lignite-surface Mining | 212114 | Surface Coal Mining |
| 1222 | Bituminous Coal-underground Mining | 212115 | Underground Coal Mining |
| 1231 | Anthracite Mining | 212114 | Surface Coal Mining |
| 1231 | Anthracite Mining | 212115 | Underground Coal Mining |
| 1241 | Coal Mining Services | 213113 | Support Activities for Coal Mining |
| 1241 | Coal Mining Services | 238910 | Site Preparation Contractors |
| 1311 | Crude Petroleum and Natural Gas | 211120 | Crude Petroleum Extraction |
| 1321 | Natural Gas Liquids | 211130 | Natural Gas Extraction |
| 1381 | Drilling Oil and Gas Wells | 213111 | Drilling Oil and Gas Wells |

| SIC | SIC Title | 2022 NAICS | 2022 NAICS Title |
|------------|---|-------------------|---|
| 1382 | Oil and Gas Exploration Services | 213112 | Support Activities for Oil and Gas Operations |
| 1382 | Oil and Gas Exploration Services | 541360 | Geophysical Surveying and Mapping Services |
| 1389 | Oil and Gas Field Services, Nec | 213112 | Support Activities for Oil and Gas Operations |
| 1389 | Oil and Gas Field Services, Nec | 237120 | Oil and Gas Pipeline and Related Structures Construction |
| 1389 | Oil and Gas Field Services, Nec | 238910 | Site Preparation Contractors |
| 1411 | Dimension Stone | 212311 | Dimension Stone Mining and Quarrying |
| 1422 | Crushed and Broken Limestone | 212312 | Crushed and Broken Limestone Mining and Quarrying |
| 1423 | Crushed and Broken Granite | 212313 | Crushed and Broken Granite Mining and Quarrying |
| 1429 | Crushed and Broken Stone, Nec | 212319 | Other Crushed and Broken Stone Mining and Quarrying |
| 1442 | Construction Sand and Gravel | 212321 | Construction Sand and Gravel Mining |
| 1446 | Industrial Sand | 212322 | Industrial Sand Mining |
| 1455 | Kaolin and Ball Clay | 212323 | Kaolin, Clay, and Ceramic and Refractory Minerals Mining |
| 1459 | Clay and Related Minerals, Nec | 212323 | Kaolin, Clay, and Ceramic and Refractory Minerals Mining |
| 1474 | Potash, Soda, and Borate Minerals | 212390 | Other Nonmetallic Mineral Mining and Quarrying |
| 1475 | Phosphate Rock | 212390 | Other Nonmetallic Mineral Mining and Quarrying |
| 1479 | Chemical and Fertilizer Mining | 212390 | Other Nonmetallic Mineral Mining and Quarrying |
| 1481 | Nonmetallic Minerals Services, Except Fuels | 213115 | Support Activities for Nonmetallic Minerals (except Fuels) Mining |
| 1481 | Nonmetallic Mineral Services | 238910 | Site Preparation Contractors |
| 1481 | Nonmetallic Mineral Services | 541360 | Geophysical Surveying and Mapping Services |

| SIC | SIC Title | 2022 NAICS | 2022 NAICS Title |
|------------|--------------------------------------|-------------------|--|
| 1499 | Miscellaneous Nonmetallic Mining | 212319 | Other Crushed and Broken Stone Mining and Quarrying |
| 1499 | Miscellaneous Nonmetallic Mining | 212390 | Other Nonmetallic Mineral Mining and Quarrying |
| 2011 | Meat Packing Plants | 311611 | Animal (except Poultry) Slaughtering |
| 2013 | Sausages and Other Prepared Meats | 311612 | Meat Processed from Carcasses |
| 2013 | Sausages and Other Prepared Meats | 311613 | Rendering and Meat Byproduct Processing |
| 2015 | Poultry Slaughtering and Processing | 311615 | Poultry Processing |
| 2015 | Poultry Slaughtering and Processing | 311999 | All Other Miscellaneous Food Manufacturing |
| 2021 | Creamery Butter | 311512 | Creamery Butter Manufacturing |
| 2022 | Cheese; Natural and Processed | 311513 | Cheese Manufacturing |
| 2023 | Dry, Condensed, Evaporated Products | 311511 | Fluid Milk Manufacturing |
| 2023 | Dry, Condensed, Evaporated Products | 311514 | Dry, Condensed, and Evaporated Dairy Product Manufacturing |
| 2024 | Ice Cream and Frozen Desserts | 311520 | Ice Cream and Frozen Dessert Manufacturing |
| 2026 | Fluid Milk | 311511 | Fluid Milk Manufacturing |
| 2026 | Fluid Milk | 311514 | Dry, Condensed, and Evaporated Dairy Product Manufacturing |
| 2032 | Canned Specialties | 311422 | Specialty Canning |
| 2032 | Canned Specialties | 311999 | All Other Miscellaneous Food Manufacturing |
| 2033 | Canned Fruits and Specialties | 311421 | Fruit and Vegetable Canning |
| 2034 | Dehydrated Fruits, Vegetables, Soups | 311211 | Flour Milling |

| SIC | SIC Title | 2022 NAICS | 2022 NAICS Title |
|------------|--------------------------------------|-------------------|--|
| 2034 | Dehydrated Fruits, Vegetables, Soups | 311423 | Dried and Dehydrated Food Manufacturing |
| 2034 | Dehydrated Fruits, Vegetables, Soups | 311999 | All Other Miscellaneous Food Manufacturing |
| 2035 | Pickles, Sauces, and Salad Dressings | 311421 | Fruit and Vegetable Canning |
| 2035 | Pickles, Sauces, and Salad Dressings | 311941 | Mayonnaise, Dressing, and Other Prepared Sauce Manufacturing |
| 2037 | Frozen Fruits and Vegetables | 311411 | Frozen Fruit, Juice, and Vegetable Manufacturing |
| 2038 | Frozen Specialties, Nec | 311412 | Frozen Specialty Food Manufacturing |
| 2041 | Flour and Other Grain Mill Products | 311211 | Flour Milling |
| 2043 | Cereal Breakfast Foods | 311230 | Breakfast Cereal Manufacturing |
| 2043 | Cereal Breakfast Foods | 311920 | Coffee and Tea Manufacturing |
| 2044 | Rice Milling | 311212 | Rice Milling |
| 2045 | Prepared Flour Mixes and Doughs | 311824 | Dry Pasta, Dough, and Flour Mixes Manufacturing from Purchased Flour |
| 2046 | Wet Corn Milling | 311221 | Wet Corn Milling and Starch Manufacturing |
| 2046 | Wet Corn Milling | 311225 | Fats and Oils Refining and Blending |
| 2047 | Dog and Cat Food | 311111 | Dog and Cat Food Manufacturing |
| 2048 | Prepared Feeds, Nec | 311119 | Other Animal Food Manufacturing |
| 2048 | Prepared Feeds, Nec | 311611 | Animal (except Poultry) Slaughtering |
| 2051 | Bread, Cake, and Related Products | 311812 | Commercial Bakeries |
| 2052 | Cookies and Crackers | 311812 | Commercial Bakeries |
| 2052 | Cookies and Crackers | 311821 | Cookie and Cracker Manufacturing |
| 2052 | Cookies and Crackers | 311919 | Other Snack Food Manufacturing |

| SIC | SIC Title | 2022 NAICS | 2022 NAICS Title |
|------------|--|-------------------|--|
| 2053 | Frozen Bakery Products, Except Bread | 311813 | Frozen Cakes, Pies, and Other Pastries Manufacturing |
| 2061 | Raw Cane Sugar | 311314 | Cane Sugar Manufacturing |
| 2062 | Cane Sugar Refining | 311314 | Cane Sugar Manufacturing |
| 2063 | Beet Sugar | 311313 | Beet Sugar Manufacturing |
| 2064 | Candy and Other Confectionery Products | 311340 | Nonchocolate Confectionery Manufacturing |
| 2064 | Candy and Other Confectionery Products | 311352 | Confectionery Manufacturing from Purchased Chocolate |
| 2066 | Chocolate and Cocoa Products | 311351 | Chocolate and Confectionery Manufacturing from Cacao Beans |
| 2066 | Chocolate and Cocoa Products | 311352 | Confectionery Manufacturing from Purchased Chocolate |
| 2067 | Chewing Gum | 311340 | Nonchocolate Confectionery Manufacturing |
| 2068 | Salted and Roasted Nuts and Seeds | 311911 | Roasted Nuts and Peanut Butter Manufacturing |
| 2074 | Cottonseed Oil Mills | 311224 | Soybean and Other Oilseed Processing |
| 2074 | Cottonseed Oil Mills | 311225 | Fats and Oils Refining and Blending |
| 2075 | Soybean Oil Mills | 311224 | Soybean and Other Oilseed Processing |
| 2075 | Soybean Oil Mills | 311225 | Fats and Oils Refining and Blending |
| 2076 | Vegetable Oil Mills, Nec | 311224 | Soybean and Other Oilseed Processing |
| 2076 | Vegetable Oil Mills, Nec | 311225 | Fats and Oils Refining and Blending |
| 2077 | Animal and Marine Fats and Oils | 311613 | Rendering and Meat Byproduct Processing |
| 2077 | Animal and Marine Fats and Oils | 311710 | Seafood Product Preparation and Packaging |
| 2077 | Animal and Marine Fats and Oils | 311710 | Seafood Product Preparation and Packaging |
| 2079 | Edible Fats and Oils | 311224 | Soybean and Other Oilseed Processing |
| 2079 | Edible Fats and Oils | 311224 | Soybean and Other Oilseed Processing |

| SIC | SIC Title | 2022 NAICS | 2022 NAICS Title |
|------------|------------------------------------|-------------------|--|
| 2079 | Edible Fats and Oils | 311225 | Fats and Oils Refining and Blending |
| 2082 | Malt Beverages | 311942 | Spice and Extract Manufacturing |
| 2082 | Malt Beverages | 312120 | Breweries |
| 2083 | Malt | 311213 | Malt Manufacturing |
| 2084 | Wines, Brandy, and Brandy Spirits | 312130 | Wineries |
| 2085 | Distilled and Blended Liquors | 312130 | Wineries |
| 2085 | Distilled and Blended Liquors | 312140 | Distilleries |
| 2086 | Bottled and Canned Soft Drinks | 312111 | Soft Drink Manufacturing |
| 2086 | Bottled and Canned Soft Drinks | 312112 | Bottled Water Manufacturing |
| 2087 | Flavoring Extracts and Syrups, Nec | 311920 | Coffee and Tea Manufacturing |
| 2087 | Flavoring Extracts and Syrups, Nec | 311930 | Flavoring Syrup and Concentrate Manufacturing |
| 2087 | Flavoring Extracts and Syrups, Nec | 311942 | Spice and Extract Manufacturing |
| 2087 | Flavoring Extracts and Syrups, Nec | 311999 | All Other Miscellaneous Food Manufacturing |
| 2091 | Canned and Cured Fish and Seafoods | 311710 | Seafood Product Preparation and Packaging |
| 2092 | Fresh or Frozen Packaged Fish | 311710 | Seafood Product Preparation and Packaging |
| 2095 | Roasted Coffee | 311920 | Coffee and Tea Manufacturing |
| 2096 | Potato Chips and Similar Snacks | 311919 | Other Snack Food Manufacturing |
| 2097 | Manufactured Ice | 312113 | Ice Manufacturing |
| 2098 | Macaroni and Spaghetti | 311824 | Dry Pasta, Dough, and Flour Mixes Manufacturing from Purchased Flour |
| 2099 | Food Preparations, Nec | 111998 | All Other Miscellaneous Crop Farming |
| 2099 | Food Preparations, Nec | 112519 | Other Aquaculture |
| 2099 | Food Preparations, Nec | 311212 | Rice Milling |
| 2099 | Food Preparations, Nec | 311340 | Nonchocolate Confectionery Manufacturing |

| SIC | SIC Title | 2022 NAICS | 2022 NAICS Title |
|------------|----------------------------------|-------------------|--|
| 2099 | Food Preparations, Nec | 311423 | Dried and Dehydrated Food Manufacturing |
| 2099 | Food Preparations, Nec | 311824 | Dry Pasta, Dough, and Flour Mixes Manufacturing from Purchased Flour |
| 2099 | Food Preparations, Nec | 311830 | Tortilla Manufacturing |
| 2099 | Food Preparations, Nec | 311911 | Roasted Nuts and Peanut Butter Manufacturing |
| 2099 | Food Preparations, Nec | 311920 | Coffee and Tea Manufacturing |
| 2099 | Food Preparations, Nec | 311941 | Mayonnaise, Dressing, and Other Prepared Sauce Manufacturing |
| 2099 | Food Preparations, Nec | 311942 | Spice and Extract Manufacturing |
| 2099 | Food Preparations, Nec | 311991 | Perishable Prepared Food Manufacturing |
| 2099 | Food Preparations, Nec | 311999 | All Other Miscellaneous Food Manufacturing |
| 2111 | Cigarettes | 312230 | Tobacco Manufacturing |
| 2121 | Cigars | 312230 | Tobacco Manufacturing |
| 2131 | Chewing and Smoking Tobacco | 312230 | Tobacco Manufacturing |
| 2141 | Tobacco Stemming and Redrying | 312230 | Tobacco Manufacturing |
| 2141 | Tobacco Stemming and Redrying | 312230 | Tobacco Manufacturing |
| 2211 | Broadwoven Fabric Mills, Cotton | 313210 | Broadwoven Fabric Mills |
| 2221 | Broadwoven Fabric Mills, Manmade | 313210 | Broadwoven Fabric Mills |
| 2231 | Broadwoven Fabric Mills, Wool | 313210 | Broadwoven Fabric Mills |
| 2231 | Broadwoven Fabric Mills, Wool | 313310 | Textile and Fabric Finishing Mills |
| 2231 | Broadwoven Fabric Mills, Wool | 313310 | Textile and Fabric Finishing Mills |
| 2241 | Narrow Fabric Mills | 313220 | Narrow Fabric Mills and Schiffli Machine Embroidery |
| 2251 | Women's Hosiery, Except Socks | 313310 | Textile and Fabric Finishing Mills |

| SIC | SIC Title | 2022 NAICS | 2022 NAICS Title |
|------------|---------------------------------|-------------------|------------------------------------|
| 2251 | Women's Hosiery, Except Socks | 315120 | Apparel Knitting Mills |
| 2252 | Hosiery, Nec | 313310 | Textile and Fabric Finishing Mills |
| 2252 | Hosiery, Nec | 315120 | Apparel Knitting Mills |
| 2252 | Hosiery, Nec | 315120 | Apparel Knitting Mills |
| 2253 | Knit Outerwear Mills | 313310 | Textile and Fabric Finishing Mills |
| 2253 | Knit Outerwear Mills | 315120 | Apparel Knitting Mills |
| 2253 | Knit Outerwear Mills | 315120 | Apparel Knitting Mills |
| 2254 | Knit Underwear Mills | 313310 | Textile and Fabric Finishing Mills |
| 2254 | Knit Underwear Mills | 315120 | Apparel Knitting Mills |
| 2257 | Weft Knit Fabric Mills | 313240 | Knit Fabric Mills |
| 2257 | Weft Knit Fabric Mills | 313310 | Textile and Fabric Finishing Mills |
| 2258 | Lace and Warp Knit Fabric Mills | 313240 | Knit Fabric Mills |
| 2258 | Lace and Warp Knit Fabric Mills | 313310 | Textile and Fabric Finishing Mills |
| 2259 | Knitting Mills, Nec | 313240 | Knit Fabric Mills |
| 2259 | Knitting Mills, Nec | 313240 | Knit Fabric Mills |
| 2259 | Knitting Mills, Nec | 313310 | Textile and Fabric Finishing Mills |
| 2259 | Knitting Mills, Nec | 315120 | Apparel Knitting Mills |
| 2259 | Knitting Mills, Nec | 315120 | Apparel Knitting Mills |
| 2261 | Finishing Plants, Cotton | 313310 | Textile and Fabric Finishing Mills |
| 2262 | Finishing Plants, Manmade | 313310 | Textile and Fabric Finishing Mills |
| 2269 | Finishing Plants, Nec | 313310 | Textile and Fabric Finishing Mills |
| 2269 | Finishing Plants, Nec | 313310 | Textile and Fabric Finishing Mills |
| 2273 | Carpets and Rugs | 314110 | Carpet and Rug Mills |
| 2281 | Yarn Spinning Mills | 313110 | Fiber, Yarn, and Thread Mills |

| SIC | SIC Title | 2022 NAICS | 2022 NAICS Title |
|------------|---------------------------------|-------------------|--|
| 2282 | Throwing and Winding Mills | 313110 | Fiber, Yarn, and Thread Mills |
| 2284 | Thread Mills | 313110 | Fiber, Yarn, and Thread Mills |
| 2284 | Thread Mills | 313310 | Textile and Fabric Finishing Mills |
| 2295 | Coated Fabrics, Not Rubberized | 313320 | Fabric Coating Mills |
| 2296 | Tire Cord and Fabrics | 314994 | Rope, Cordage, Twine, Tire Cord, and Tire Fabric Mills |
| 2297 | Nonwoven Fabrics | 313230 | Nonwoven Fabric Mills |
| 2298 | Cordage and Twine | 313110 | Fiber, Yarn, and Thread Mills |
| 2298 | Cordage and Twine | 314994 | Rope, Cordage, Twine, Tire Cord, and Tire Fabric Mills |
| 2299 | Textile Goods, Nec | 313110 | Fiber, Yarn, and Thread Mills |
| 2299 | Textile Goods, Nec | 313110 | Fiber, Yarn, and Thread Mills |
| 2299 | Textile Goods, Nec | 313110 | Fiber, Yarn, and Thread Mills |
| 2299 | Textile Goods, Nec | 313210 | Broadwoven Fabric Mills |
| 2299 | Textile Goods, Nec | 313220 | Narrow Fabric Mills and Schiffli Machine Embroidery |
| 2299 | Textile Goods, Nec | 313230 | Nonwoven Fabric Mills |
| 2299 | Textile Goods, Nec | 313310 | Textile and Fabric Finishing Mills |
| 2299 | Textile Goods, Nec | 314999 | All Other Miscellaneous Textile Product Mills |
| 2311 | Men's and Boy's Suits and Coats | 314999 | All Other Miscellaneous Textile Product Mills |
| 2311 | Men's and Boy's Suits and Coats | 315210 | Cut and Sew Apparel Contractors |
| 2311 | Men's and Boy's Suits and Coats | 315250 | Cut and Sew Apparel Manufacturing (except Contractors) |
| 2321 | Men's and Boy's Furnishings | 314999 | All Other Miscellaneous Textile Product Mills |
| 2321 | Men's and Boy's Furnishings | 315210 | Cut and Sew Apparel Contractors |

| SIC | SIC Title | 2022 NAICS | 2022 NAICS Title |
|------------|---|-------------------|--|
| 2321 | Men's and Boy's Furnishings | 315250 | Cut and Sew Apparel Manufacturing (except Contractors) |
| 2322 | Men's and Boy's Underwear and Nightwear | 314999 | All Other Miscellaneous Textile Product Mills |
| 2322 | Men's and Boy's Underwear and Nightwear | 315210 | Cut and Sew Apparel Contractors |
| 2322 | Men's and Boy's Underwear and Nightwear | 315250 | Cut and Sew Apparel Manufacturing (except Contractors) |
| 2323 | Men's and Boy's Neckwear | 314999 | All Other Miscellaneous Textile Product Mills |
| 2323 | Men's and Boy's Neckwear | 315210 | Cut and Sew Apparel Contractors |
| 2323 | Men's and Boy's Neckwear | 315990 | Apparel Accessories and Other Apparel Manufacturing |
| 2325 | Men's and Boy's Trousers and Slacks | 314999 | All Other Miscellaneous Textile Product Mills |
| 2325 | Men's and Boy's Trousers and Slacks | 315210 | Cut and Sew Apparel Contractors |
| 2325 | Men's and Boy's Trousers and Slacks | 315250 | Cut and Sew Apparel Manufacturing (except Contractors) |
| 2326 | Men's and Boy's Work Clothing | 314999 | All Other Miscellaneous Textile Product Mills |
| 2326 | Men's and Boy's Work Clothing | 315210 | Cut and Sew Apparel Contractors |
| 2326 | Men's and Boy's Work Clothing | 315250 | Cut and Sew Apparel Manufacturing (except Contractors) |
| 2329 | Men's and Boy's Clothing, Nec | 314999 | All Other Miscellaneous Textile Product Mills |
| 2329 | Men's and Boy's Clothing, Nec | 315210 | Cut and Sew Apparel Contractors |
| 2329 | Men's and Boy's Clothing, Nec | 315250 | Cut and Sew Apparel Manufacturing (except Contractors) |
| 2329 | Men's and Boy's Clothing, Nec | 315250 | Cut and Sew Apparel Manufacturing (except Contractors) |
| 2331 | Women's and Misses' Blouses and Shirts | 314999 | All Other Miscellaneous Textile Product Mills |

| SIC | SIC Title | 2022 NAICS | 2022 NAICS Title |
|------------|--|-------------------|--|
| 2331 | Women's and Misses' Blouses and Shirts | 315210 | Cut and Sew Apparel Contractors |
| 2331 | Women's and Misses' Blouses and Shirts | 315250 | Cut and Sew Apparel Manufacturing (except Contractors) |
| 2335 | Women's, Junior's, and Misses' Dresses | 314999 | All Other Miscellaneous Textile Product Mills |
| 2335 | Women's, Junior's, and Misses' Dresses | 315210 | Cut and Sew Apparel Contractors |
| 2335 | Women's, Junior's, and Misses' Dresses | 315250 | Cut and Sew Apparel Manufacturing (except Contractors) |
| 2337 | Women's and Misses' Suits and Coats | 314999 | All Other Miscellaneous Textile Product Mills |
| 2337 | Women's and Misses' Suits and Coats | 315210 | Cut and Sew Apparel Contractors |
| 2337 | Women's and Misses' Suits and Coats | 315250 | Cut and Sew Apparel Manufacturing (except Contractors) |
| 2339 | Women's and Misses' Outerwear, Nec | 314999 | All Other Miscellaneous Textile Product Mills |
| 2339 | Women's and Misses' Outerwear, Nec | 315210 | Cut and Sew Apparel Contractors |
| 2339 | Women's and Misses' Outerwear, Nec | 315250 | Cut and Sew Apparel Manufacturing (except Contractors) |
| 2339 | Women's and Misses' Outerwear, Nec | 315250 | Cut and Sew Apparel Manufacturing (except Contractors) |
| 2339 | Women's and Misses' Outerwear, Nec | 315990 | Apparel Accessories and Other Apparel Manufacturing |
| 2341 | Women's and Children's Underwear | 314999 | All Other Miscellaneous Textile Product Mills |
| 2341 | Women's and Children's Underwear | 314999 | All Other Miscellaneous Textile Product Mills |
| 2341 | Women's and Children's Underwear | 315210 | Cut and Sew Apparel Contractors |

| SIC | SIC Title | 2022 NAICS | 2022 NAICS Title |
|------------|--|-------------------|--|
| 2341 | Women's and Children's Underwear | 315210 | Cut and Sew Apparel Contractors |
| 2341 | Women's and Children's Underwear | 315250 | Cut and Sew Apparel Manufacturing (except Contractors) |
| 2341 | Women's and Children's Underwear | 315250 | Cut and Sew Apparel Manufacturing (except Contractors) |
| 2341 | Women's and Children's Underwear | 315250 | Cut and Sew Apparel Manufacturing (except Contractors) |
| 2342 | Bras, Girdles, and Allied Garments | 314999 | All Other Miscellaneous Textile Product Mills |
| 2342 | Bras, Girdles, and Allied Garments | 315210 | Cut and Sew Apparel Contractors |
| 2342 | Bras, Girdles, and Allied Garments | 315250 | Cut and Sew Apparel Manufacturing (except Contractors) |
| 2353 | Hats, Caps, and Millinery | 314999 | All Other Miscellaneous Textile Product Mills |
| 2353 | Hats, Caps, and Millinery | 314999 | All Other Miscellaneous Textile Product Mills |
| 2353 | Hats, Caps, and Millinery | 315210 | Cut and Sew Apparel Contractors |
| 2353 | Hats, Caps, and Millinery | 315210 | Cut and Sew Apparel Contractors |
| 2353 | Hats, Caps, and Millinery | 315990 | Apparel Accessories and Other Apparel Manufacturing |
| 2361 | Girl's and Children's Dresses, Blouses | 314999 | All Other Miscellaneous Textile Product Mills |
| 2361 | Girl's and Children's Dresses, Blouses | 314999 | All Other Miscellaneous Textile Product Mills |
| 2361 | Girl's and Children's Dresses, Blouses | 315210 | Cut and Sew Apparel Contractors |
| 2361 | Girl's and Children's Dresses, Blouses | 315210 | Cut and Sew Apparel Contractors |
| 2361 | Girl's and Children's Dresses, Blouses | 315250 | Cut and Sew Apparel Manufacturing (except Contractors) |
| 2361 | Girl's and Children's Dresses, Blouses | 315250 | Cut and Sew Apparel Manufacturing (except Contractors) |

| SIC | SIC Title | 2022 NAICS | 2022 NAICS Title |
|------------|--|-------------------|--|
| 2361 | Girl's and Children's Dresses, Blouses | 315250 | Cut and Sew Apparel Manufacturing (except Contractors) |
| 2361 | Girl's and Children's Dresses, Blouses | 315250 | Cut and Sew Apparel Manufacturing (except Contractors) |
| 2369 | Girl's and Children's Outerwear, Nec | 314999 | All Other Miscellaneous Textile Product Mills |
| 2369 | Girl's and Children's Outerwear, Nec | 314999 | All Other Miscellaneous Textile Product Mills |
| 2369 | Girl's and Children's Outerwear, Nec | 315210 | Cut and Sew Apparel Contractors |
| 2369 | Girl's and Children's Outerwear, Nec | 315210 | Cut and Sew Apparel Contractors |
| 2369 | Girl's and Children's Outerwear, Nec | 315250 | Cut and Sew Apparel Manufacturing (except Contractors) |
| 2369 | Girl's and Children's Outerwear, Nec | 315250 | Cut and Sew Apparel Manufacturing (except Contractors) |
| 2369 | Girl's and Children's Outerwear, Nec | 315250 | Cut and Sew Apparel Manufacturing (except Contractors) |
| 2369 | Girl's and Children's Outerwear, Nec | 315250 | Cut and Sew Apparel Manufacturing (except Contractors) |
| 2369 | Girl's and Children's Outerwear, Nec | 315250 | Cut and Sew Apparel Manufacturing (except Contractors) |
| 2369 | Girl's and Children's Outerwear, Nec | 315250 | Cut and Sew Apparel Manufacturing (except Contractors) |
| 2369 | Girl's and Children's Outerwear, Nec | 315250 | Cut and Sew Apparel Manufacturing (except Contractors) |
| 2369 | Girl's and Children's Outerwear, Nec | 315250 | Cut and Sew Apparel Manufacturing (except Contractors) |
| 2371 | Fur Goods | 314999 | All Other Miscellaneous Textile Product Mills |
| 2371 | Fur Goods | 314999 | All Other Miscellaneous Textile Product Mills |
| 2371 | Fur Goods | 315210 | Cut and Sew Apparel Contractors |

| SIC | SIC Title | 2022 NAICS | 2022 NAICS Title |
|------------|------------------------------|-------------------|--|
| 2371 | Fur Goods | 315210 | Cut and Sew Apparel Contractors |
| 2371 | Fur Goods | 315250 | Cut and Sew Apparel Manufacturing (except Contractors) |
| 2381 | Fabric Dress and Work Gloves | 314999 | All Other Miscellaneous Textile Product Mills |
| 2381 | Fabric Dress and Work Gloves | 314999 | All Other Miscellaneous Textile Product Mills |
| 2381 | Fabric Dress and Work Gloves | 315210 | Cut and Sew Apparel Contractors |
| 2381 | Fabric Dress and Work Gloves | 315210 | Cut and Sew Apparel Contractors |
| 2381 | Fabric Dress and Work Gloves | 315990 | Apparel Accessories and Other Apparel Manufacturing |
| 2384 | Robes and Dressing Gowns | 314999 | All Other Miscellaneous Textile Product Mills |
| 2384 | Robes and Dressing Gowns | 314999 | All Other Miscellaneous Textile Product Mills |
| 2384 | Robes and Dressing Gowns | 315210 | Cut and Sew Apparel Contractors |
| 2384 | Robes and Dressing Gowns | 315210 | Cut and Sew Apparel Contractors |
| 2384 | Robes and Dressing Gowns | 315250 | Cut and Sew Apparel Manufacturing (except Contractors) |
| 2384 | Robes and Dressing Gowns | 315250 | Cut and Sew Apparel Manufacturing (except Contractors) |
| 2385 | Waterproof Outerwear | 314999 | All Other Miscellaneous Textile Product Mills |
| 2385 | Waterproof Outerwear | 314999 | All Other Miscellaneous Textile Product Mills |
| 2385 | Waterproof Outerwear | 315210 | Cut and Sew Apparel Contractors |
| 2385 | Waterproof Outerwear | 315210 | Cut and Sew Apparel Contractors |
| 2385 | Waterproof Outerwear | 315250 | Cut and Sew Apparel Manufacturing (except Contractors) |
| 2385 | Waterproof Outerwear | 315250 | Cut and Sew Apparel Manufacturing (except Contractors) |
| 2385 | Waterproof Outerwear | 315250 | Cut and Sew Apparel Manufacturing (except Contractors) |

| SIC | SIC Title | 2022 NAICS | 2022 NAICS Title |
|------------|----------------------------------|-------------------|--|
| 2385 | Waterproof Outerwear | 315250 | Cut and Sew Apparel Manufacturing (except Contractors) |
| 2385 | Waterproof Outerwear | 315250 | Cut and Sew Apparel Manufacturing (except Contractors) |
| 2385 | Waterproof Outerwear | 315250 | Cut and Sew Apparel Manufacturing (except Contractors) |
| 2385 | Waterproof Outerwear | 315990 | Apparel Accessories and Other Apparel Manufacturing |
| 2386 | Leather and Sheep-lined Clothing | 314999 | All Other Miscellaneous Textile Product Mills |
| 2386 | Leather and Sheep-lined Clothing | 314999 | All Other Miscellaneous Textile Product Mills |
| 2386 | Leather and Sheep-lined Clothing | 315210 | Cut and Sew Apparel Contractors |
| 2386 | Leather and Sheep-lined Clothing | 315210 | Cut and Sew Apparel Contractors |
| 2386 | Leather and Sheep-lined Clothing | 315250 | Cut and Sew Apparel Manufacturing (except Contractors) |
| 2387 | Apparel Belts | 314999 | All Other Miscellaneous Textile Product Mills |
| 2387 | Apparel Belts | 314999 | All Other Miscellaneous Textile Product Mills |
| 2387 | Apparel Belts | 315210 | Cut and Sew Apparel Contractors |
| 2387 | Apparel Belts | 315210 | Cut and Sew Apparel Contractors |
| 2387 | Apparel Belts | 315990 | Apparel Accessories and Other Apparel Manufacturing |
| 2389 | Apparel and Accessories, Nec | 314999 | All Other Miscellaneous Textile Product Mills |
| 2389 | Apparel and Accessories, Nec | 314999 | All Other Miscellaneous Textile Product Mills |
| 2389 | Apparel and Accessories, Nec | 315210 | Cut and Sew Apparel Contractors |
| 2389 | Apparel and Accessories, Nec | 315210 | Cut and Sew Apparel Contractors |
| 2389 | Apparel and Accessories, Nec | 315250 | Cut and Sew Apparel Manufacturing (except Contractors) |
| 2389 | Apparel and Accessories, Nec | 315250 | Cut and Sew Apparel Manufacturing (except Contractors) |

| SIC | SIC Title | 2022 NAICS | 2022 NAICS Title |
|------------|----------------------------------|-------------------|---|
| 2389 | Apparel and Accessories, Nec | 315990 | Apparel Accessories and Other Apparel Manufacturing |
| 2391 | Curtains and Draperies | 314120 | Curtain and Linen Mills |
| 2392 | Household Furnishings, Nec | 314120 | Curtain and Linen Mills |
| 2392 | Household Furnishings, Nec | 314910 | Textile Bag and Canvas Mills |
| 2392 | Household Furnishings, Nec | 314999 | All Other Miscellaneous Textile Product Mills |
| 2392 | Household Furnishings, Nec | 339994 | Broom, Brush, and Mop Manufacturing |
| 2393 | Textile Bags | 314910 | Textile Bag and Canvas Mills |
| 2394 | Canvas and Related Products | 314910 | Textile Bag and Canvas Mills |
| 2395 | Pleating and Stitching | 314999 | All Other Miscellaneous Textile Product Mills |
| 2395 | Pleating and Stitching | 314999 | All Other Miscellaneous Textile Product Mills |
| 2395 | Pleating and Stitching | 314999 | All Other Miscellaneous Textile Product Mills |
| 2395 | Pleating and Stitching | 315210 | Cut and Sew Apparel Contractors |
| 2395 | Pleating and Stitching | 315210 | Cut and Sew Apparel Contractors |
| 2396 | Automotive and Apparel Trimmings | 314999 | All Other Miscellaneous Textile Product Mills |
| 2396 | Automotive and Apparel Trimmings | 314999 | All Other Miscellaneous Textile Product Mills |
| 2396 | Automotive and Apparel Trimmings | 314999 | All Other Miscellaneous Textile Product Mills |
| 2396 | Automotive and Apparel Trimmings | 315210 | Cut and Sew Apparel Contractors |
| 2396 | Automotive and Apparel Trimmings | 315210 | Cut and Sew Apparel Contractors |
| 2396 | Automotive and Apparel Trimmings | 315990 | Apparel Accessories and Other Apparel Manufacturing |
| 2396 | Automotive and Apparel Trimmings | 323113 | Commercial Screen Printing |

| SIC | SIC Title | 2022 NAICS | 2022 NAICS Title |
|------------|---------------------------------------|-------------------|---|
| 2396 | Automotive and Apparel Trimmings | 336360 | Motor Vehicle Seating and Interior Trim Manufacturing |
| 2397 | Schiffli Machine Embroideries | 313220 | Narrow Fabric Mills and Schiffli Machine Embroidery |
| 2399 | Fabricated Textile Products, Nec | 314999 | All Other Miscellaneous Textile Product Mills |
| 2399 | Fabricated Textile Products, Nec | 314999 | All Other Miscellaneous Textile Product Mills |
| 2399 | Fabricated Textile Products, Nec | 314999 | All Other Miscellaneous Textile Product Mills |
| 2399 | Fabricated Textile Products, Nec | 315210 | Cut and Sew Apparel Contractors |
| 2399 | Fabricated Textile Products, Nec | 315210 | Cut and Sew Apparel Contractors |
| 2399 | Fabricated Textile Products, Nec | 315990 | Apparel Accessories and Other Apparel Manufacturing |
| 2399 | Fabricated Textile Products, Nec | 336360 | Motor Vehicle Seating and Interior Trim Manufacturing |
| 2411 | Logging | 113310 | Logging |
| 2421 | Sawmills and Planing Mills, General | 321113 | Sawmills |
| 2421 | Sawmills and Planing Mills, General | 321912 | Cut Stock, Resawing Lumber, and Planing |
| 2421 | Sawmills and Planing Mills, General | 321918 | Other Millwork (including Flooring) |
| 2421 | Sawmills and Planing Mills, General | 321920 | Wood Container and Pallet Manufacturing |
| 2421 | Sawmills and Planing Mills, General | 321999 | All Other Miscellaneous Wood Product Manufacturing |
| 2426 | Hardwood Dimension and Flooring Mills | 321113 | Sawmills |
| 2426 | Hardwood Dimension and Flooring Mills | 321912 | Cut Stock, Resawing Lumber, and Planing |
| 2426 | Hardwood Dimension and Flooring Mills | 321918 | Other Millwork (including Flooring) |

| SIC | SIC Title | 2022 NAICS | 2022 NAICS Title |
|------------|---------------------------------------|-------------------|---|
| 2426 | Hardwood Dimension and Flooring Mills | 337215 | Showcase, Partition, Shelving, and Locker Manufacturing |
| 2429 | Special Product Sawmills, Nec | 321113 | Sawmills |
| 2429 | Special Product Sawmills, Nec | 321920 | Wood Container and Pallet Manufacturing |
| 2429 | Special Product Sawmills, Nec | 321999 | All Other Miscellaneous Wood Product Manufacturing |
| 2431 | Millwork | 321911 | Wood Window and Door Manufacturing |
| 2431 | Millwork | 321918 | Other Millwork (including Flooring) |
| 2434 | Wood Kitchen Cabinets | 337110 | Wood Kitchen Cabinet and Countertop Manufacturing |
| 2435 | Hardwood Veneer and Plywood | 321211 | Hardwood Veneer and Plywood Manufacturing |
| 2436 | Softwood Veneer and Plywood | 321212 | Softwood Veneer and Plywood Manufacturing |
| 2439 | Structural Wood Members, Nec | 321215 | Engineered Wood Member Manufacturing |
| 2439 | Structural Wood Members, Nec | 321215 | Engineered Wood Member Manufacturing |
| 2441 | Nailed Wood Boxes and Shook | 321920 | Wood Container and Pallet Manufacturing |
| 2448 | Wood Pallets and Skids | 321920 | Wood Container and Pallet Manufacturing |
| 2449 | Wood Containers, Nec | 321920 | Wood Container and Pallet Manufacturing |
| 2451 | Mobile Homes | 321991 | Manufactured Home (Mobile Home) Manufacturing |
| 2452 | Prefabricated Wood Buildings | 321992 | Prefabricated Wood Building Manufacturing |
| 2491 | Wood Preserving | 321114 | Wood Preservation |
| 2493 | Reconstituted Wood Products | 321219 | Reconstituted Wood Product Manufacturing |
| 2499 | Wood Products, Nec | 321920 | Wood Container and Pallet Manufacturing |
| 2499 | Wood Products, Nec | 321999 | All Other Miscellaneous Wood Product Manufacturing |

| SIC | SIC Title | 2022 NAICS | 2022 NAICS Title |
|------------|---------------------------------------|-------------------|---|
| 2499 | Wood Products, Nec | 333415 | Air-Conditioning and Warm Air Heating Equipment and Commercial and Industrial Refrigeration Equipment Manufacturing |
| 2499 | Wood Products, Nec | 337126 | Household Furniture (except Wood and Upholstered) Manufacturing |
| 2499 | Wood Products, Nec | 339113 | Surgical Appliance and Supplies Manufacturing |
| 2499 | Wood Products, Nec | 339999 | All Other Miscellaneous Manufacturing |
| 2511 | Wood Household Furniture | 337122 | Nonupholstered Wood Household Furniture Manufacturing |
| 2511 | Wood Household Furniture | 337215 | Showcase, Partition, Shelving, and Locker Manufacturing |
| 2512 | Upholstered Household Furniture | 337121 | Upholstered Household Furniture Manufacturing |
| 2514 | Metal Household Furniture | 337121 | Upholstered Household Furniture Manufacturing |
| 2514 | Metal Household Furniture | 337126 | Household Furniture (except Wood and Upholstered) Manufacturing |
| 2514 | Metal Household Furniture | 337215 | Showcase, Partition, Shelving, and Locker Manufacturing |
| 2515 | Mattresses and Bedsprings | 337121 | Upholstered Household Furniture Manufacturing |
| 2515 | Mattresses and Bedsprings | 337910 | Mattress Manufacturing |
| 2517 | Wood Television and Radio Cabinets | 321999 | All Other Miscellaneous Wood Product Manufacturing |
| 2519 | Household Furniture, Nec | 337126 | Household Furniture (except Wood and Upholstered) Manufacturing |
| 2521 | Wood Office Furniture | 337211 | Wood Office Furniture Manufacturing |
| 2522 | Office Furniture, Except Wood | 337214 | Office Furniture (except Wood) Manufacturing |
| 2531 | Public Building and Related Furniture | 336360 | Motor Vehicle Seating and Interior Trim Manufacturing |

| SIC | SIC Title | 2022 NAICS | 2022 NAICS Title |
|------------|--|-------------------|---|
| 2531 | Public Building and Related Furniture | 337127 | Institutional Furniture Manufacturing |
| 2531 | Public Building and Related Furniture | 339940 | Office Supplies (except Paper) Manufacturing |
| 2541 | Wood Partitions and Fixtures | 337110 | Wood Kitchen Cabinet and Countertop Manufacturing |
| 2541 | Wood Partitions and Fixtures | 337127 | Institutional Furniture Manufacturing |
| 2541 | Wood Partitions and Fixtures | 337212 | Custom Architectural Woodwork and Millwork Manufacturing |
| 2541 | Wood Partitions and Fixtures | 337215 | Showcase, Partition, Shelving, and Locker Manufacturing |
| 2542 | Partitions and Fixtures, Except Wood | 337127 | Institutional Furniture Manufacturing |
| 2542 | Partitions and Fixtures, Except Wood | 337215 | Showcase, Partition, Shelving, and Locker Manufacturing |
| 2591 | Drapery Hardware and Blinds and Shades | 337920 | Blind and Shade Manufacturing |
| 2599 | Furniture and Fixtures, Nec | 333248 | All Other Industrial Machinery Manufacturing |
| 2599 | Furniture and Fixtures, Nec | 333415 | Air-Conditioning and Warm Air Heating Equipment and Commercial and Industrial Refrigeration Equipment Manufacturing |
| 2599 | Furniture and Fixtures, Nec | 333994 | Industrial Process Furnace and Oven Manufacturing |
| 2599 | Furniture and Fixtures, Nec | 333998 | All Other Miscellaneous General Purpose Machinery Manufacturing |
| 2599 | Furniture and Fixtures, Nec | 333998 | All Other Miscellaneous General Purpose Machinery Manufacturing |
| 2599 | Furniture and Fixtures, Nec | 337127 | Institutional Furniture Manufacturing |
| 2599 | Furniture and Fixtures, Nec | 337127 | Institutional Furniture Manufacturing |
| 2599 | Furniture and Fixtures, Nec | 339113 | Surgical Appliance and Supplies Manufacturing |

| SIC | SIC Title | 2022 NAICS | 2022 NAICS Title |
|------------|---|-------------------|---|
| 2611 | Pulp Mills | 322110 | Pulp Mills |
| 2611 | Pulp Mills | 322120 | Paper Mills |
| 2611 | Pulp Mills | 322120 | Paper Mills |
| 2611 | Pulp Mills | 322130 | Paperboard Mills |
| 2621 | Paper Mills | 322120 | Paper Mills |
| 2621 | Paper Mills | 322120 | Paper Mills |
| 2631 | Paperboard Mills | 322130 | Paperboard Mills |
| 2652 | Setup Paperboard Boxes | 322219 | Other Paperboard Container Manufacturing |
| 2653 | Corrugated and Solid Fiber Boxes | 322211 | Corrugated and Solid Fiber Box Manufacturing |
| 2655 | Fiber Cans, Drums, and Similar Products | 322219 | Other Paperboard Container Manufacturing |
| 2656 | Sanitary Food Containers | 322219 | Other Paperboard Container Manufacturing |
| 2657 | Folding Paperboard Boxes | 322212 | Folding Paperboard Box Manufacturing |
| 2671 | Paper; Coated and Laminated Packaging | 322220 | Paper Bag and Coated and Treated Paper Manufacturing |
| 2671 | Paper; Coated and Laminated Packaging | 326112 | Plastics Packaging Film and Sheet (including Laminated) Manufacturing |
| 2672 | Paper; Coated and Laminated, Nec | 322220 | Paper Bag and Coated and Treated Paper Manufacturing |
| 2673 | Bags: Plastic, Laminated, and Coated | 322220 | Paper Bag and Coated and Treated Paper Manufacturing |
| 2673 | Bags: Plastic, Laminated, and Coated | 326111 | Plastics Bag and Pouch Manufacturing |
| 2674 | Bags: Uncoated Paper and Multiwall | 322220 | Paper Bag and Coated and Treated Paper Manufacturing |
| 2675 | Die-cut Paper and Board | 322220 | Paper Bag and Coated and Treated Paper Manufacturing |
| 2675 | Die-cut Paper and Board | 322230 | Stationery Product Manufacturing |

| SIC | SIC Title | 2022 NAICS | 2022 NAICS Title |
|------------|-------------------------------|-------------------|--|
| 2675 | Die-cut Paper and Board | 322299 | All Other Converted Paper Product Manufacturing |
| 2676 | Sanitary Paper Products | 322291 | Sanitary Paper Product Manufacturing |
| 2677 | Envelopes | 322230 | Stationery Product Manufacturing |
| 2678 | Stationery Products | 322230 | Stationery Product Manufacturing |
| 2679 | Converted Paper Products, Nec | 322211 | Corrugated and Solid Fiber Box Manufacturing |
| 2679 | Converted Paper Products, Nec | 322220 | Paper Bag and Coated and Treated Paper Manufacturing |
| 2679 | Converted Paper Products, Nec | 322230 | Stationery Product Manufacturing |
| 2679 | Converted Paper Products, Nec | 322299 | All Other Converted Paper Product Manufacturing |
| 2711 | Newspapers | 513110 | Newspaper Publishers |
| 2711 | Newspapers | 513110 | Newspaper Publishers |
| 2721 | Periodicals | 513120 | Periodical Publishers |
| 2721 | Periodicals | 513120 | Periodical Publishers |
| 2731 | Book Publishing | 512230 | Music Publishers |
| 2731 | Book Publishing | 513130 | Book Publishers |
| 2731 | Book Publishing | 513130 | Book Publishers |
| 2732 | Book Printing | 323117 | Books Printing |
| 2741 | Miscellaneous Publishing | 512230 | Music Publishers |
| 2741 | Miscellaneous Publishing | 513120 | Periodical Publishers |
| 2741 | Miscellaneous Publishing | 513130 | Book Publishers |
| 2741 | Miscellaneous Publishing | 513140 | Directory and Mailing List Publishers |
| 2741 | Miscellaneous Publishing | 513199 | All Other Publishers |
| 2741 | Miscellaneous Publishing | 513199 | All Other Publishers |

| SIC | SIC Title | 2022 NAICS | 2022 NAICS Title |
|------------|-----------------------------------|-------------------|---|
| 2752 | Commercial Printing, Lithographic | 323111 | Commercial Printing (except Screen and Books) |
| 2752 | Commercial Printing, Lithographic | 323111 | Commercial Printing (except Screen and Books) |
| 2754 | Commercial Printing, Gravure | 323111 | Commercial Printing (except Screen and Books) |
| 2759 | Commercial Printing, Nec | 323111 | Commercial Printing (except Screen and Books) |
| 2759 | Commercial Printing, Nec | 323111 | Commercial Printing (except Screen and Books) |
| 2759 | Commercial Printing, Nec | 323111 | Commercial Printing (except Screen and Books) |
| 2759 | Commercial Printing, Nec | 323111 | Commercial Printing (except Screen and Books) |
| 2759 | Commercial Printing, Nec | 323111 | Commercial Printing (except Screen and Books) |
| 2759 | Commercial Printing, Nec | 323113 | Commercial Screen Printing |
| 2761 | Manifold Business Forms | 323111 | Commercial Printing (except Screen and Books) |
| 2771 | Greeting Cards | 323111 | Commercial Printing (except Screen and Books) |
| 2771 | Greeting Cards | 323111 | Commercial Printing (except Screen and Books) |
| 2771 | Greeting Cards | 323111 | Commercial Printing (except Screen and Books) |
| 2771 | Greeting Cards | 323111 | Commercial Printing (except Screen and Books) |
| 2771 | Greeting Cards | 323111 | Commercial Printing (except Screen and Books) |
| 2771 | Greeting Cards | 323113 | Commercial Screen Printing |
| 2771 | Greeting Cards | 513191 | Greeting Card Publishers |
| 2782 | Blankbooks and Looseleaf Binders | 323111 | Commercial Printing (except Screen and Books) |
| 2782 | Blankbooks and Looseleaf Binders | 323111 | Commercial Printing (except Screen and Books) |

| SIC | SIC Title | 2022 NAICS | 2022 NAICS Title |
|------------|-------------------------------------|-------------------|--|
| 2789 | Bookbinding and Related Work | 323120 | Support Activities for Printing |
| 2791 | Typesetting | 323120 | Support Activities for Printing |
| 2796 | Platemaking Services | 323120 | Support Activities for Printing |
| 2812 | Alkalies and Chlorine | 325180 | Other Basic Inorganic Chemical Manufacturing |
| 2813 | Industrial Gases | 325120 | Industrial Gas Manufacturing |
| 2816 | Inorganic Pigments | 325130 | Synthetic Dye and Pigment Manufacturing |
| 2816 | Inorganic Pigments | 325180 | Other Basic Inorganic Chemical Manufacturing |
| 2819 | Industrial Inorganic Chemicals, Nec | 211130 | Natural Gas Extraction |
| 2819 | Industrial Inorganic Chemicals, Nec | 325130 | Synthetic Dye and Pigment Manufacturing |
| 2819 | Industrial Inorganic Chemicals, Nec | 325180 | Other Basic Inorganic Chemical Manufacturing |
| 2819 | Industrial Inorganic Chemicals, Nec | 325998 | All Other Miscellaneous Chemical Product and Preparation Manufacturing |
| 2819 | Industrial Inorganic Chemicals, Nec | 331313 | Alumina Refining and Primary Aluminum Production |
| 2821 | Plastics Materials and Resins | 325211 | Plastics Material and Resin Manufacturing |
| 2822 | Synthetic Rubber | 325212 | Synthetic Rubber Manufacturing |
| 2823 | Cellulosic Manmade Fibers | 325220 | Artificial and Synthetic Fibers and Filaments Manufacturing |
| 2824 | Organic Fibers, Noncellulosic | 325220 | Artificial and Synthetic Fibers and Filaments Manufacturing |
| 2833 | Medicinals and Botanicals | 325411 | Medicinal and Botanical Manufacturing |
| 2834 | Pharmaceutical Preparations | 325412 | Pharmaceutical Preparation Manufacturing |
| 2835 | Diagnostic Substances | 325412 | Pharmaceutical Preparation Manufacturing |
| 2835 | Diagnostic Substances | 325413 | In-Vitro Diagnostic Substance Manufacturing |

| SIC | SIC Title | 2022 NAICS | 2022 NAICS Title |
|------------|--|-------------------|--|
| 2836 | Biological Products, Except Diagnostic | 325414 | Biological Product (except Diagnostic) Manufacturing |
| 2841 | Soap and Other Detergents | 325611 | Soap and Other Detergent Manufacturing |
| 2842 | Polishes and Sanitation Goods | 325612 | Polish and Other Sanitation Good Manufacturing |
| 2843 | Surface Active Agents | 325613 | Surface Active Agent Manufacturing |
| 2844 | Toilet Preparations | 325611 | Soap and Other Detergent Manufacturing |
| 2844 | Toilet Preparations | 325620 | Toilet Preparation Manufacturing |
| 2851 | Paints and Allied Products | 325510 | Paint and Coating Manufacturing |
| 2861 | Gum and Wood Chemicals | 325194 | Cyclic Crude, Intermediate, and Gum and Wood Chemical Manufacturing |
| 2865 | Cyclic Crudes and Intermediates | 325110 | Petrochemical Manufacturing |
| 2865 | Cyclic Crudes and Intermediates | 325130 | Synthetic Dye and Pigment Manufacturing |
| 2865 | Cyclic Crudes and Intermediates | 325194 | Cyclic Crude, Intermediate, and Gum and Wood Chemical Manufacturing |
| 2869 | Industrial Organic Chemicals, Nec | 325110 | Petrochemical Manufacturing |
| 2869 | Industrial Organic Chemicals, Nec | 325120 | Industrial Gas Manufacturing |
| 2869 | Industrial Organic Chemicals, Nec | 325180 | Other Basic Inorganic Chemical Manufacturing |
| 2869 | Industrial Organic Chemicals, Nec | 325193 | Ethyl Alcohol Manufacturing |
| 2869 | Industrial Organic Chemicals, Nec | 325194 | Cyclic Crude, Intermediate, and Gum and Wood Chemical Manufacturing |
| 2869 | Industrial Organic Chemicals, Nec | 325199 | All Other Basic Organic Chemical Manufacturing |
| 2869 | Industrial Organic Chemicals, Nec | 325998 | All Other Miscellaneous Chemical Product and Preparation Manufacturing |
| 2873 | Nitrogenous Fertilizers | 325311 | Nitrogenous Fertilizer Manufacturing |
| 2874 | Phosphatic Fertilizers | 325312 | Phosphatic Fertilizer Manufacturing |

| SIC | SIC Title | 2022 NAICS | 2022 NAICS Title |
|------------|---------------------------------------|-------------------|--|
| 2875 | Fertilizers, Mixing Only | 325314 | Fertilizer (Mixing Only) Manufacturing |
| 2875 | Fertilizers, Mixing Only | 325315 | Compost Manufacturing |
| 2879 | Agricultural Chemicals, Nec | 325320 | Pesticide and Other Agricultural Chemical Manufacturing |
| 2891 | Adhesives and Sealants | 325520 | Adhesive Manufacturing |
| 2892 | Explosives | 325920 | Explosives Manufacturing |
| 2893 | Printing Ink | 325910 | Printing Ink Manufacturing |
| 2895 | Carbon Black | 325180 | Other Basic Inorganic Chemical Manufacturing |
| 2899 | Chemical Preparations, Nec | 311942 | Spice and Extract Manufacturing |
| 2899 | Chemical Preparations, Nec | 325199 | All Other Basic Organic Chemical Manufacturing |
| 2899 | Chemical Preparations, Nec | 325510 | Paint and Coating Manufacturing |
| 2899 | Chemical Preparations, Nec | 325998 | All Other Miscellaneous Chemical Product and Preparation Manufacturing |
| 2911 | Petroleum Refining | 324110 | Petroleum Refineries |
| 2951 | Asphalt Paving Mixtures and Blocks | 324121 | Asphalt Paving Mixture and Block Manufacturing |
| 2952 | Asphalt Felts and Coatings | 324122 | Asphalt Shingle and Coating Materials Manufacturing |
| 2992 | Lubricating Oils and Greases | 324191 | Petroleum Lubricating Oil and Grease Manufacturing |
| 2999 | Petroleum and Coal Products, Nec | 324199 | All Other Petroleum and Coal Products Manufacturing |
| 3011 | Tires and Inner Tubes | 326211 | Tire Manufacturing (except Retreading) |
| 3021 | Rubber and Plastics Footwear | 316210 | Footwear Manufacturing |
| 3052 | Rubber and Plastics Hose and Beltings | 326220 | Rubber and Plastics Hoses and Belting Manufacturing |

| SIC | SIC Title | 2022 NAICS | 2022 NAICS Title |
|------------|--------------------------------------|-------------------|---|
| 3053 | Gaskets; Packing and Sealing Devices | 339991 | Gasket, Packing, and Sealing Device Manufacturing |
| 3061 | Mechanical Rubber Goods | 326291 | Rubber Product Manufacturing for Mechanical Use |
| 3061 | Mechanical Rubber Goods | 326299 | All Other Rubber Product Manufacturing |
| 3069 | Fabricated Rubber Products, Nec | 313320 | Fabric Coating Mills |
| 3069 | Fabricated Rubber Products, Nec | 314910 | Textile Bag and Canvas Mills |
| 3069 | Fabricated Rubber Products, Nec | 315250 | Cut and Sew Apparel Manufacturing (except Contractors) |
| 3069 | Fabricated Rubber Products, Nec | 315990 | Apparel Accessories and Other Apparel Manufacturing |
| 3069 | Fabricated Rubber Products, Nec | 326199 | All Other Plastics Product Manufacturing |
| 3069 | Fabricated Rubber Products, Nec | 326299 | All Other Rubber Product Manufacturing |
| 3069 | Fabricated Rubber Products, Nec | 336612 | Boat Building |
| 3069 | Fabricated Rubber Products, Nec | 339113 | Surgical Appliance and Supplies Manufacturing |
| 3069 | Fabricated Rubber Products, Nec | 339920 | Sporting and Athletic Goods Manufacturing |
| 3069 | Fabricated Rubber Products, Nec | 339930 | Doll, Toy, and Game Manufacturing |
| 3081 | Unsupported Plastics Film and Sheet | 326113 | Unlaminated Plastics Film and Sheet (except Packaging) Manufacturing |
| 3082 | Unsupported Plastics Profile Shapes | 326121 | Unlaminated Plastics Profile Shape Manufacturing |
| 3083 | Laminated Plastics Plate and Sheet | 326130 | Laminated Plastics Plate, Sheet (except Packaging), and Shape Manufacturing |
| 3084 | Plastics Pipe | 326122 | Plastics Pipe and Pipe Fitting Manufacturing |
| 3085 | Plastics Bottles | 326160 | Plastics Bottle Manufacturing |
| 3086 | Plastics Foam Products | 326140 | Polystyrene Foam Product Manufacturing |

| SIC | SIC Title | 2022 NAICS | 2022 NAICS Title |
|------------|-----------------------------------|-------------------|--|
| 3086 | Plastics Foam Products | 326150 | Urethane and Other Foam Product (except Polystyrene) Manufacturing |
| 3087 | Custom Compound Purchased Resins | 325991 | Custom Compounding of Purchased Resins |
| 3088 | Plastics Plumbing Fixtures | 326191 | Plastics Plumbing Fixture Manufacturing |
| 3089 | Plastics Products, Nec | 326121 | Unlaminated Plastics Profile Shape Manufacturing |
| 3089 | Plastics Products, Nec | 326122 | Plastics Pipe and Pipe Fitting Manufacturing |
| 3089 | Plastics Products, Nec | 326199 | All Other Plastics Product Manufacturing |
| 3089 | Plastics Products, Nec | 336612 | Boat Building |
| 3089 | Plastics Products, Nec | 337215 | Showcase, Partition, Shelving, and Locker Manufacturing |
| 3089 | Plastics Products, Nec | 339113 | Surgical Appliance and Supplies Manufacturing |
| 3111 | Leather Tanning and Finishing | 316110 | Leather and Hide Tanning and Finishing |
| 3131 | Footwear Cut Stock | 316990 | Other Leather and Allied Product Manufacturing |
| 3131 | Footwear Cut Stock | 321999 | All Other Miscellaneous Wood Product Manufacturing |
| 3131 | Footwear Cut Stock | 339993 | Fastener, Button, Needle, and Pin Manufacturing |
| 3142 | House Slippers | 316210 | Footwear Manufacturing |
| 3143 | Men's Footwear, Except athletic | 316210 | Footwear Manufacturing |
| 3144 | Women's Footwear, Except athletic | 316210 | Footwear Manufacturing |
| 3149 | Footwear, Except Rubber, Nec | 316210 | Footwear Manufacturing |
| 3151 | Leather Gloves and Mittens | 314999 | All Other Miscellaneous Textile Product Mills |
| 3151 | Leather Gloves and Mittens | 314999 | All Other Miscellaneous Textile Product Mills |

| SIC | SIC Title | 2022 NAICS | 2022 NAICS Title |
|------------|--------------------------------|-------------------|---|
| 3151 | Leather Gloves and Mittens | 315210 | Cut and Sew Apparel Contractors |
| 3151 | Leather Gloves and Mittens | 315210 | Cut and Sew Apparel Contractors |
| 3151 | Leather Gloves and Mittens | 315990 | Apparel Accessories and Other Apparel Manufacturing |
| 3161 | Luggage | 316990 | Other Leather and Allied Product Manufacturing |
| 3171 | Women's Handbags and Purses | 316990 | Other Leather and Allied Product Manufacturing |
| 3172 | Personal Leather Goods, Nec | 316990 | Other Leather and Allied Product Manufacturing |
| 3172 | Personal Leather Goods, Nec | 339910 | Jewelry and Silverware Manufacturing |
| 3199 | Leather Goods, Nec | 316990 | Other Leather and Allied Product Manufacturing |
| 3211 | Flat Glass | 327211 | Flat Glass Manufacturing |
| 3221 | Glass Containers | 327213 | Glass Container Manufacturing |
| 3229 | Pressed and Blown Glass, Nec | 327212 | Other Pressed and Blown Glass and Glassware Manufacturing |
| 3231 | Products of Purchased Glass | 327215 | Glass Product Manufacturing Made of Purchased Glass |
| 3241 | Cement, Hydraulic | 327310 | Cement Manufacturing |
| 3251 | Brick and Structural Clay Tile | 327120 | Clay Building Material and Refractories Manufacturing |
| 3251 | Brick and Structural Clay Tile | 327331 | Concrete Block and Brick Manufacturing |
| 3253 | Ceramic Wall and Floor Tile | 327120 | Clay Building Material and Refractories Manufacturing |
| 3255 | Clay Refractories | 327120 | Clay Building Material and Refractories Manufacturing |
| 3259 | Structural Clay Products, Nec | 327120 | Clay Building Material and Refractories Manufacturing |

| SIC | SIC Title | 2022 NAICS | 2022 NAICS Title |
|------------|--------------------------------------|-------------------|---|
| 3261 | Vitreous Plumbing Fixtures | 327110 | Pottery, Ceramics, and Plumbing Fixture Manufacturing |
| 3262 | Vitreous China Table and Kitchenware | 327110 | Pottery, Ceramics, and Plumbing Fixture Manufacturing |
| 3263 | Semivitreous Table and Kitchenware | 327110 | Pottery, Ceramics, and Plumbing Fixture Manufacturing |
| 3264 | Porcelain Electrical Supplies | 327110 | Pottery, Ceramics, and Plumbing Fixture Manufacturing |
| 3269 | Pottery Products, Nec | 327110 | Pottery, Ceramics, and Plumbing Fixture Manufacturing |
| 3271 | Concrete Block and Brick | 327331 | Concrete Block and Brick Manufacturing |
| 3272 | Concrete Products, Nec | 327332 | Concrete Pipe Manufacturing |
| 3272 | Concrete Products, Nec | 327390 | Other Concrete Product Manufacturing |
| 3272 | Concrete Products, Nec | 327999 | All Other Miscellaneous Nonmetallic Mineral Product Manufacturing |
| 3273 | Ready-mixed Concrete | 327320 | Ready-Mix Concrete Manufacturing |
| 3274 | Lime | 327410 | Lime Manufacturing |
| 3275 | Gypsum Products | 327420 | Gypsum Product Manufacturing |
| 3281 | Cut Stone and Stone Products | 327991 | Cut Stone and Stone Product Manufacturing |
| 3291 | Abrasive Products | 327910 | Abrasive Product Manufacturing |
| 3291 | Abrasive Products | 332999 | All Other Miscellaneous Fabricated Metal Product Manufacturing |
| 3292 | Asbestos Products | 327999 | All Other Miscellaneous Nonmetallic Mineral Product Manufacturing |
| 3292 | Asbestos Products | 336340 | Motor Vehicle Brake System Manufacturing |
| 3292 | Asbestos Products | 336350 | Motor Vehicle Transmission and Power Train Parts Manufacturing |
| 3295 | Minerals, Ground or Treated | 212323 | Kaolin, Clay, and Ceramic and Refractory Minerals Mining |

| SIC | SIC Title | 2022 NAICS | 2022 NAICS Title |
|------------|---------------------------------|-------------------|---|
| 3295 | Minerals, Ground or Treated | 212323 | Kaolin, Clay, and Ceramic and Refractory Minerals Mining |
| 3295 | Minerals, Ground or Treated | 212390 | Other Nonmetallic Mineral Mining and Quarrying |
| 3295 | Minerals, Ground or Treated | 212390 | Other Nonmetallic Mineral Mining and Quarrying |
| 3295 | Minerals, Ground or Treated | 327992 | Ground or Treated Mineral and Earth Manufacturing |
| 3296 | Mineral Wool | 327993 | Mineral Wool Manufacturing |
| 3297 | Nonclay Refractories | 327120 | Clay Building Material and Refractories Manufacturing |
| 3299 | Nonmetallic Mineral Products, | 327110 | Pottery, Ceramics, and Plumbing Fixture Manufacturing |
| 3299 | Nonmetallic Mineral Products, | 327420 | Gypsum Product Manufacturing |
| 3299 | Nonmetallic Mineral Products, | 327999 | All Other Miscellaneous Nonmetallic Mineral Product Manufacturing |
| 3312 | Blast Furnaces and Steel Mills | 324199 | All Other Petroleum and Coal Products Manufacturing |
| 3312 | Blast Furnaces and Steel Mills | 331110 | Iron and Steel Mills and Ferroalloy Manufacturing |
| 3312 | Blast Furnaces and Steel Mills | 331221 | Rolled Steel Shape Manufacturing |
| 3313 | Electrometallurgical Products | 331110 | Iron and Steel Mills and Ferroalloy Manufacturing |
| 3315 | Steel Wire and Related Products | 331222 | Steel Wire Drawing |
| 3315 | Steel Wire and Related Products | 332618 | Other Fabricated Wire Product Manufacturing |
| 3316 | Cold Finishing of Steel Shapes | 331221 | Rolled Steel Shape Manufacturing |
| 3317 | Steel Pipe and Tubes | 331210 | Iron and Steel Pipe and Tube Manufacturing from Purchased Steel |
| 3321 | Gray and Ductile Iron Foundries | 331511 | Iron Foundries |

| SIC | SIC Title | 2022 NAICS | 2022 NAICS Title |
|------------|---------------------------------------|-------------------|---|
| 3322 | Malleable Iron Foundries | 331511 | Iron Foundries |
| 3324 | Steel Investment Foundries | 331512 | Steel Investment Foundries |
| 3325 | Steel Foundries, Nec | 331513 | Steel Foundries (except Investment) |
| 3331 | Primary Copper | 331410 | Nonferrous Metal (except Aluminum) Smelting and Refining |
| 3334 | Primary Aluminum | 331313 | Alumina Refining and Primary Aluminum Production |
| 3339 | Primary Nonferrous Metals, Nec | 331410 | Nonferrous Metal (except Aluminum) Smelting and Refining |
| 3341 | Secondary Nonferrous Metals | 331314 | Secondary Smelting and Alloying of Aluminum |
| 3341 | Secondary Nonferrous Metals | 331420 | Copper Rolling, Drawing, Extruding, and Alloying |
| 3341 | Secondary Nonferrous Metals | 331492 | Secondary Smelting, Refining, and Alloying of Nonferrous Metal (except Copper and Aluminum) |
| 3351 | Copper Rolling and Drawing | 331420 | Copper Rolling, Drawing, Extruding, and Alloying |
| 3353 | Aluminum Sheet, Plate, and Foil | 331315 | Aluminum Sheet, Plate, and Foil Manufacturing |
| 3354 | Aluminum Extruded Products | 331318 | Other Aluminum Rolling, Drawing, and Extruding |
| 3355 | Aluminum Rolling and Drawing, Nec | 331318 | Other Aluminum Rolling, Drawing, and Extruding |
| 3356 | Nonferrous Rolling and Drawing, Nec | 331491 | Nonferrous Metal (except Copper and Aluminum) Rolling, Drawing, and Extruding |
| 3357 | Nonferrous Wiredrawing and Insulating | 331318 | Other Aluminum Rolling, Drawing, and Extruding |
| 3357 | Nonferrous Wiredrawing and Insulating | 331420 | Copper Rolling, Drawing, Extruding, and Alloying |
| 3357 | Nonferrous Wiredrawing and Insulating | 331491 | Nonferrous Metal (except Copper and Aluminum) Rolling, Drawing, and Extruding |

| SIC | SIC Title | 2022 NAICS | 2022 NAICS Title |
|------------|---|-------------------|---|
| 3357 | Nonferrous Wiredrawing and Insulating | 335921 | Fiber Optic Cable Manufacturing |
| 3357 | Nonferrous Wiredrawing and Insulating | 335929 | Other Communication and Energy Wire Manufacturing |
| 3363 | Aluminum Die-castings | 331523 | Nonferrous Metal Die-Casting Foundries |
| 3364 | Nonferrous Die-castings Except Aluminum | 331523 | Nonferrous Metal Die-Casting Foundries |
| 3365 | Aluminum Foundries | 331524 | Aluminum Foundries (except Die-Casting) |
| 3366 | Copper Foundries | 331529 | Other Nonferrous Metal Foundries (except Die-Casting) |
| 3369 | Nonferrous Foundries, Nec | 331529 | Other Nonferrous Metal Foundries (except Die-Casting) |
| 3398 | Metal Heat Treating | 332811 | Metal Heat Treating |
| 3399 | Primary Metal Products | 331110 | Iron and Steel Mills and Ferroalloy Manufacturing |
| 3399 | Primary Metal Products | 331221 | Rolled Steel Shape Manufacturing |
| 3399 | Primary Metal Products | 331314 | Secondary Smelting and Alloying of Aluminum |
| 3399 | Primary Metal Products | 331420 | Copper Rolling, Drawing, Extruding, and Alloying |
| 3399 | Primary Metal Products | 331492 | Secondary Smelting, Refining, and Alloying of Nonferrous Metal (except Copper and Aluminum) |
| 3399 | Primary Metal Products | 332618 | Other Fabricated Wire Product Manufacturing |
| 3399 | Primary Metal Products | 332813 | Electroplating, Plating, Polishing, Anodizing, and Coloring |
| 3411 | Metal Cans | 332431 | Metal Can Manufacturing |
| 3412 | Metal Barrels, Drums, and Pails | 332439 | Other Metal Container Manufacturing |
| 3421 | Cutlery | 332215 | Metal Kitchen Cookware, Utensil, Cutlery, and Flatware (except Precious) Manufacturing |

| SIC | SIC Title | 2022 NAICS | 2022 NAICS Title |
|------------|------------------------------------|-------------------|--|
| 3421 | Cutlery | 332216 | Saw Blade and Handtool Manufacturing |
| 3423 | Hand and Edge Tools, Nec | 332216 | Saw Blade and Handtool Manufacturing |
| 3425 | Saw Blades and Handsaws | 332216 | Saw Blade and Handtool Manufacturing |
| 3429 | Hardware, Nec | 332439 | Other Metal Container Manufacturing |
| 3429 | Hardware, Nec | 332510 | Hardware Manufacturing |
| 3429 | Hardware, Nec | 332722 | Bolt, Nut, Screw, Rivet, and Washer Manufacturing |
| 3429 | Hardware, Nec | 332919 | Other Metal Valve and Pipe Fitting Manufacturing |
| 3429 | Hardware, Nec | 332999 | All Other Miscellaneous Fabricated Metal Product Manufacturing |
| 3429 | Hardware, Nec | 333923 | Overhead Traveling Crane, Hoist, and Monorail System Manufacturing |
| 3429 | Hardware, Nec | 334519 | Other Measuring and Controlling Device Manufacturing |
| 3429 | Hardware, Nec | 336390 | Other Motor Vehicle Parts Manufacturing |
| 3429 | Hardware, Nec | 337215 | Showcase, Partition, Shelving, and Locker Manufacturing |
| 3431 | Metal Sanitary Ware | 332999 | All Other Miscellaneous Fabricated Metal Product Manufacturing |
| 3432 | Plumbing Fixture Fittings and Trim | 332913 | Plumbing Fixture Fitting and Trim Manufacturing |
| 3432 | Plumbing Fixture Fittings and Trim | 332919 | Other Metal Valve and Pipe Fitting Manufacturing |
| 3432 | Plumbing Fixture Fittings and Trim | 332999 | All Other Miscellaneous Fabricated Metal Product Manufacturing |
| 3433 | Heating Equipment, Except Electric | 333414 | Heating Equipment (except Warm Air Furnaces) Manufacturing |
| 3441 | Fabricated Structural Metal | 332312 | Fabricated Structural Metal Manufacturing |

| SIC | SIC Title | 2022 NAICS | 2022 NAICS Title |
|------------|-------------------------------------|-------------------|---|
| 3442 | Metal Doors, Sash, and Trim | 332321 | Metal Window and Door Manufacturing |
| 3443 | Fabricated Plate Work (boiler Shop) | 332313 | Plate Work Manufacturing |
| 3443 | Fabricated Plate Work (boiler Shop) | 332410 | Power Boiler and Heat Exchanger Manufacturing |
| 3443 | Fabricated Plate Work (boiler Shop) | 332420 | Metal Tank (Heavy Gauge) Manufacturing |
| 3443 | Fabricated Plate Work (boiler Shop) | 333415 | Air-Conditioning and Warm Air Heating Equipment and Commercial and Industrial Refrigeration Equipment Manufacturing |
| 3444 | Sheet Metalwork | 332321 | Metal Window and Door Manufacturing |
| 3444 | Sheet Metalwork | 332322 | Sheet Metal Work Manufacturing |
| 3444 | Sheet Metalwork | 332439 | Other Metal Container Manufacturing |
| 3444 | Sheet Metalwork | 333415 | Air-Conditioning and Warm Air Heating Equipment and Commercial and Industrial Refrigeration Equipment Manufacturing |
| 3446 | Architectural Metalwork | 332323 | Ornamental and Architectural Metal Work Manufacturing |
| 3448 | Prefabricated Metal Buildings | 332311 | Prefabricated Metal Building and Component Manufacturing |
| 3449 | Miscellaneous Metalwork | 332114 | Custom Roll Forming |
| 3449 | Miscellaneous Metalwork | 332312 | Fabricated Structural Metal Manufacturing |
| 3449 | Miscellaneous Metalwork | 332323 | Ornamental and Architectural Metal Work Manufacturing |
| 3451 | Screw Machine Products | 332721 | Precision Turned Product Manufacturing |
| 3452 | Bolts, Nuts, Rivets, and Washers | 332722 | Bolt, Nut, Screw, Rivet, and Washer Manufacturing |
| 3462 | Iron and Steel Forgings | 332111 | Iron and Steel Forging |
| 3463 | Nonferrous Forgings | 332112 | Nonferrous Forging |

| SIC | SIC Title | 2022 NAICS | 2022 NAICS Title |
|------------|--|-------------------|--|
| 3465 | Automotive Stampings | 336370 | Motor Vehicle Metal Stamping |
| 3466 | Crowns and Closures | 332119 | Metal Crown, Closure, and Other Metal Stamping (except Automotive) |
| 3469 | Metal Stampings, Nec | 332119 | Metal Crown, Closure, and Other Metal Stamping (except Automotive) |
| 3469 | Metal Stampings, Nec | 332215 | Metal Kitchen Cookware, Utensil, Cutlery, and Flatware (except Precious) Manufacturing |
| 3469 | Metal Stampings, Nec | 332439 | Other Metal Container Manufacturing |
| 3471 | Plating and Polishing | 332813 | Electroplating, Plating, Polishing, Anodizing, and Coloring |
| 3479 | Metal Coating and Allied Services | 332812 | Metal Coating, Engraving (except Jewelry and Silverware), and Allied Services to Manufacturers |
| 3479 | Metal Coating and Allied Services | 339910 | Jewelry and Silverware Manufacturing |
| 3479 | Metal Coating and Allied Services | 339910 | Jewelry and Silverware Manufacturing |
| 3479 | Metal Coating and Allied Services | 339910 | Jewelry and Silverware Manufacturing |
| 3482 | Small Arms Ammunition | 332992 | Small Arms Ammunition Manufacturing |
| 3483 | Ammunition, Except For Small Arms, Nec | 332993 | Ammunition (except Small Arms) Manufacturing |
| 3484 | Small Arms | 332994 | Small Arms, Ordnance, and Ordnance Accessories Manufacturing |
| 3489 | Ordnance and Accessories, Nec | 332994 | Small Arms, Ordnance, and Ordnance Accessories Manufacturing |
| 3491 | Industrial Valves | 332911 | Industrial Valve Manufacturing |
| 3492 | Fluid Power Valves and Hose Fittings | 332912 | Fluid Power Valve and Hose Fitting Manufacturing |
| 3493 | Steel Springs, Except Wire | 332613 | Spring Manufacturing |
| 3494 | Valves and Pipe Fittings, Nec | 332919 | Other Metal Valve and Pipe Fitting Manufacturing |

| SIC | SIC Title | 2022 NAICS | 2022 NAICS Title |
|------------|--|-------------------|--|
| 3494 | Valves and Pipe Fittings, Nec | 332999 | All Other Miscellaneous Fabricated Metal Product Manufacturing |
| 3495 | Wire Springs | 332613 | Spring Manufacturing |
| 3495 | Wire Springs | 334519 | Other Measuring and Controlling Device Manufacturing |
| 3496 | Miscellaneous Fabricated Wire Products | 332215 | Metal Kitchen Cookware, Utensil, Cutlery, and Flatware (except Precious) Manufacturing |
| 3496 | Miscellaneous Fabricated Wire Products | 332618 | Other Fabricated Wire Product Manufacturing |
| 3496 | Miscellaneous Fabricated Wire Products | 333924 | Industrial Truck, Tractor, Trailer, and Stacker Machinery Manufacturing |
| 3497 | Metal Foil and Leaf | 322220 | Paper Bag and Coated and Treated Paper Manufacturing |
| 3497 | Metal Foil and Leaf | 332999 | All Other Miscellaneous Fabricated Metal Product Manufacturing |
| 3498 | Fabricated Pipe and Fittings | 332996 | Fabricated Pipe and Pipe Fitting Manufacturing |
| 3499 | Fabricated Metal Products, Nec | 332117 | Powder Metallurgy Part Manufacturing |
| 3499 | Fabricated Metal Products, Nec | 332439 | Other Metal Container Manufacturing |
| 3499 | Fabricated Metal Products, Nec | 332510 | Hardware Manufacturing |
| 3499 | Fabricated Metal Products, Nec | 332919 | Other Metal Valve and Pipe Fitting Manufacturing |
| 3499 | Fabricated Metal Products, Nec | 332999 | All Other Miscellaneous Fabricated Metal Product Manufacturing |
| 3499 | Fabricated Metal Products, Nec | 336360 | Motor Vehicle Seating and Interior Trim Manufacturing |
| 3499 | Fabricated Metal Products, Nec | 337215 | Showcase, Partition, Shelving, and Locker Manufacturing |
| 3511 | Turbines and Turbine Generator Sets | 333611 | Turbine and Turbine Generator Set Units Manufacturing |
| 3519 | Internal Combustion Engines, Nec | 333618 | Other Engine Equipment Manufacturing |

| SIC | SIC Title | 2022 NAICS | 2022 NAICS Title |
|------------|-----------------------------------|-------------------|--|
| 3519 | Internal Combustion Engines, Nec | 336390 | Other Motor Vehicle Parts Manufacturing |
| 3523 | Farm Machinery and Equipment | 332216 | Saw Blade and Handtool Manufacturing |
| 3523 | Farm Machinery and Equipment | 332323 | Ornamental and Architectural Metal Work Manufacturing |
| 3523 | Farm Machinery and Equipment | 333111 | Farm Machinery and Equipment Manufacturing |
| 3523 | Farm Machinery and Equipment | 333922 | Conveyor and Conveying Equipment Manufacturing |
| 3524 | Lawn and Garden Equipment | 332216 | Saw Blade and Handtool Manufacturing |
| 3524 | Lawn and Garden Equipment | 333112 | Lawn and Garden Tractor and Home Lawn and Garden Equipment Manufacturing |
| 3531 | Construction Machinery | 333120 | Construction Machinery Manufacturing |
| 3531 | Construction Machinery | 333923 | Overhead Traveling Crane, Hoist, and Monorail System Manufacturing |
| 3531 | Construction Machinery | 336510 | Railroad Rolling Stock Manufacturing |
| 3532 | Mining Machinery | 333131 | Mining Machinery and Equipment Manufacturing |
| 3533 | Oil and Gas Field Machinery | 333132 | Oil and Gas Field Machinery and Equipment Manufacturing |
| 3534 | Elevators and Moving Stairways | 333921 | Elevator and Moving Stairway Manufacturing |
| 3535 | Conveyors and Conveying Equipment | 333922 | Conveyor and Conveying Equipment Manufacturing |
| 3536 | Hoists, Cranes, and Monorails | 333923 | Overhead Traveling Crane, Hoist, and Monorail System Manufacturing |
| 3537 | Industrial Trucks and Tractors | 332439 | Other Metal Container Manufacturing |
| 3537 | Industrial Trucks and Tractors | 332999 | All Other Miscellaneous Fabricated Metal Product Manufacturing |
| 3537 | Industrial Trucks and Tractors | 333924 | Industrial Truck, Tractor, Trailer, and Stacker Machinery Manufacturing |

| SIC | SIC Title | 2022 NAICS | 2022 NAICS Title |
|------------|---|-------------------|--|
| 3541 | Machine Tools, Metal Cutting Type | 333517 | Machine Tool Manufacturing |
| 3542 | Machine Tools, Metal Forming Type | 333517 | Machine Tool Manufacturing |
| 3543 | Industrial Patterns | 332999 | All Other Miscellaneous Fabricated Metal Product Manufacturing |
| 3544 | Special Dies, Tools, Jigs, and Fixtures | 333511 | Industrial Mold Manufacturing |
| 3544 | Special Dies, Tools, Jigs, and Fixtures | 333514 | Special Die and Tool, Die Set, Jig, and Fixture Manufacturing |
| 3545 | Machine Tool Accessories | 332216 | Saw Blade and Handtool Manufacturing |
| 3545 | Machine Tool Accessories | 333515 | Cutting Tool and Machine Tool Accessory Manufacturing |
| 3546 | Power-driven Handtools | 333991 | Power-Driven Handtool Manufacturing |
| 3547 | Rolling Mill Machinery | 333519 | Rolling Mill and Other Metalworking Machinery Manufacturing |
| 3548 | Welding Apparatus | 333992 | Welding and Soldering Equipment Manufacturing |
| 3548 | Welding Apparatus | 335311 | Power, Distribution, and Specialty Transformer Manufacturing |
| 3549 | Metalworking Machinery, Nec | 333519 | Rolling Mill and Other Metalworking Machinery Manufacturing |
| 3552 | Textile Machinery | 333248 | All Other Industrial Machinery Manufacturing |
| 3553 | Woodworking Machinery | 333243 | Sawmill, Woodworking, and Paper Machinery Manufacturing |
| 3554 | Paper Industries Machinery | 333243 | Sawmill, Woodworking, and Paper Machinery Manufacturing |
| 3554 | Paper Industries Machinery | 333243 | Sawmill, Woodworking, and Paper Machinery Manufacturing |
| 3555 | Printing Trades Machinery | 333248 | All Other Industrial Machinery Manufacturing |
| 3556 | Food Products Machinery | 333241 | Food Product Machinery Manufacturing |

| SIC | SIC Title | 2022 NAICS | 2022 NAICS Title |
|------------|-----------------------------------|-------------------|---|
| 3559 | Special Industry Machinery, Nec | 332410 | Power Boiler and Heat Exchanger Manufacturing |
| 3559 | Special Industry Machinery, Nec | 333111 | Farm Machinery and Equipment Manufacturing |
| 3559 | Special Industry Machinery, Nec | 333242 | Semiconductor Machinery Manufacturing |
| 3559 | Special Industry Machinery, Nec | 333248 | All Other Industrial Machinery Manufacturing |
| 3559 | Special Industry Machinery, Nec | 333248 | All Other Industrial Machinery Manufacturing |
| 3559 | Special Industry Machinery, Nec | 333310 | Commercial and Service Industry Machinery Manufacturing |
| 3561 | Pumps and Pumping Equipment | 333914 | Measuring, Dispensing, and Other Pumping Equipment Manufacturing |
| 3562 | Ball and Roller Bearings | 332991 | Ball and Roller Bearing Manufacturing |
| 3563 | Air and Gas Compressors | 333912 | Air and Gas Compressor Manufacturing |
| 3564 | Blowers and Fans | 333413 | Industrial and Commercial Fan and Blower and Air Purification Equipment Manufacturing |
| 3564 | Blowers and Fans | 333413 | Industrial and Commercial Fan and Blower and Air Purification Equipment Manufacturing |
| 3565 | Packaging Machinery | 333993 | Packaging Machinery Manufacturing |
| 3566 | Speed Changers, Drives, and Gears | 333612 | Speed Changer, Industrial High-Speed Drive, and Gear Manufacturing |
| 3567 | Industrial Furnaces and Ovens | 333994 | Industrial Process Furnace and Oven Manufacturing |
| 3568 | Power Transmission Equipment, Nec | 333613 | Mechanical Power Transmission Equipment Manufacturing |
| 3569 | General Industrial Machinery, | 314999 | All Other Miscellaneous Textile Product Mills |
| 3569 | General Industrial Machinery, | 333414 | Heating Equipment (except Warm Air Furnaces) Manufacturing |
| 3569 | General Industrial Machinery, | 333998 | All Other Miscellaneous General Purpose Machinery Manufacturing |

| SIC | SIC Title | 2022 NAICS | 2022 NAICS Title |
|------------|--------------------------------------|-------------------|---|
| 3571 | Electronic Computers | 334111 | Electronic Computer Manufacturing |
| 3572 | Computer Storage Devices | 334112 | Computer Storage Device Manufacturing |
| 3575 | Computer Terminals | 334118 | Computer Terminal and Other Computer Peripheral Equipment Manufacturing |
| 3577 | Computer Peripheral Equipment, Nec | 333310 | Commercial and Service Industry Machinery Manufacturing |
| 3577 | Computer Peripheral Equipment, Nec | 334118 | Computer Terminal and Other Computer Peripheral Equipment Manufacturing |
| 3577 | Computer Peripheral Equipment, Nec | 334418 | Printed Circuit Assembly (Electronic Assembly) Manufacturing |
| 3577 | Computer Peripheral Equipment, Nec | 334610 | Manufacturing and Reproducing Magnetic and Optical Media |
| 3578 | Calculating and Accounting Equipment | 333310 | Commercial and Service Industry Machinery Manufacturing |
| 3578 | Calculating and Accounting Equipment | 333310 | Commercial and Service Industry Machinery Manufacturing |
| 3578 | Calculating and Accounting Equipment | 333310 | Commercial and Service Industry Machinery Manufacturing |
| 3578 | Calculating and Accounting Equipment | 334118 | Computer Terminal and Other Computer Peripheral Equipment Manufacturing |
| 3579 | Office Machines, Nec | 333310 | Commercial and Service Industry Machinery Manufacturing |
| 3579 | Office Machines, Nec | 334519 | Other Measuring and Controlling Device Manufacturing |
| 3579 | Office Machines, Nec | 339940 | Office Supplies (except Paper) Manufacturing |
| 3581 | Automatic Vending Machines | 333310 | Commercial and Service Industry Machinery Manufacturing |
| 3582 | Commercial Laundry Equipment | 333310 | Commercial and Service Industry Machinery Manufacturing |

| SIC | SIC Title | 2022 NAICS | 2022 NAICS Title |
|------------|--|-------------------|---|
| 3585 | Refrigeration and Heating Equipment | 333415 | Air-Conditioning and Warm Air Heating Equipment and Commercial and Industrial Refrigeration Equipment Manufacturing |
| 3585 | Refrigeration and Heating Equipment | 336390 | Other Motor Vehicle Parts Manufacturing |
| 3586 | Measuring and Dispensing Pumps | 333914 | Measuring, Dispensing, and Other Pumping Equipment Manufacturing |
| 3589 | Service Industry Machinery, Nec | 333310 | Commercial and Service Industry Machinery Manufacturing |
| 3592 | Carburetors, Pistons, Rings, Valves | 336310 | Motor Vehicle Gasoline Engine and Engine Parts Manufacturing |
| 3593 | Fluid Power Cylinders and Actuators | 333995 | Fluid Power Cylinder and Actuator Manufacturing |
| 3594 | Fluid Power Pumps and Motors | 333996 | Fluid Power Pump and Motor Manufacturing |
| 3596 | Scales and Balances, Except Laboratory | 333998 | All Other Miscellaneous General Purpose Machinery Manufacturing |
| 3599 | Industrial Machinery, Nec | 332710 | Machine Shops |
| 3599 | Industrial Machinery, Nec | 332813 | Electroplating, Plating, Polishing, Anodizing, and Coloring |
| 3599 | Industrial Machinery, Nec | 332999 | All Other Miscellaneous Fabricated Metal Product Manufacturing |
| 3599 | Industrial Machinery, Nec | 333310 | Commercial and Service Industry Machinery Manufacturing |
| 3599 | Industrial Machinery, Nec | 333998 | All Other Miscellaneous General Purpose Machinery Manufacturing |
| 3599 | Industrial Machinery, Nec | 334519 | Other Measuring and Controlling Device Manufacturing |
| 3599 | Industrial Machinery, Nec | 336390 | Other Motor Vehicle Parts Manufacturing |
| 3612 | Power, Distribution and Specialty Transformers | 335311 | Power, Distribution, and Specialty Transformer Manufacturing |

| SIC | SIC Title | 2022 NAICS | 2022 NAICS Title |
|------------|--------------------------------------|-------------------|--|
| 3613 | Switchgear and Switchboard Apparatus | 335313 | Switchgear and Switchboard Apparatus Manufacturing |
| 3621 | Motors and Generators | 335312 | Motor and Generator Manufacturing |
| 3624 | Carbon and Graphite Products | 335991 | Carbon and Graphite Product Manufacturing |
| 3625 | Relays and Industrial Controls | 335314 | Relay and Industrial Control Manufacturing |
| 3629 | Electrical Industrial Apparatus | 335999 | All Other Miscellaneous Electrical Equipment and Component Manufacturing |
| 3631 | Household Cooking Equipment | 335220 | Major Household Appliance Manufacturing |
| 3632 | Household Refrigerators and Freezers | 335220 | Major Household Appliance Manufacturing |
| 3633 | Household Laundry Equipment | 335220 | Major Household Appliance Manufacturing |
| 3634 | Electric Housewares and Fans | 333414 | Heating Equipment (except Warm Air Furnaces) Manufacturing |
| 3634 | Electric Housewares and Fans | 335210 | Small Electrical Appliance Manufacturing |
| 3634 | Electric Housewares and Fans | 339999 | All Other Miscellaneous Manufacturing |
| 3635 | Household Vacuum Cleaners | 335210 | Small Electrical Appliance Manufacturing |
| 3639 | Household Appliances, Nec | 333248 | All Other Industrial Machinery Manufacturing |
| 3639 | Household Appliances, Nec | 335210 | Small Electrical Appliance Manufacturing |
| 3639 | Household Appliances, Nec | 335220 | Major Household Appliance Manufacturing |
| 3641 | Electric Lamps | 335139 | Electric Lamp Bulb and Other Lighting Equipment Manufacturing |
| 3643 | Current-carrying Wiring Devices | 335931 | Current-Carrying Wiring Device Manufacturing |
| 3644 | Noncurrent-carrying Wiring Devices | 332216 | Saw Blade and Handtool Manufacturing |
| 3644 | Noncurrent-carrying Wiring Devices | 335932 | Noncurrent-Carrying Wiring Device Manufacturing |
| 3645 | Residential Lighting Fixtures | 335131 | Residential Electric Lighting Fixture Manufacturing |

| SIC | SIC Title | 2022 NAICS | 2022 NAICS Title |
|------------|--|-------------------|---|
| 3646 | Commercial, Industrial, and Institutional Electric Lighting Fixtures | 335132 | Commercial, Industrial, and Institutional Electric Lighting Fixture Manufacturing |
| 3647 | Vehicular Lighting Equipment | 336320 | Motor Vehicle Electrical and Electronic Equipment Manufacturing |
| 3648 | Lighting Equipment, Nec | 335139 | Electric Lamp Bulb and Other Lighting Equipment Manufacturing |
| 3651 | Household Audio and Video Equipment | 334310 | Audio and Video Equipment Manufacturing |
| 3652 | Prerecorded Records and Tapes | 334610 | Manufacturing and Reproducing Magnetic and Optical Media |
| 3652 | Prerecorded Records and Tapes | 512250 | Record Production and Distribution |
| 3661 | Telephone and Telegraph Apparatus | 334210 | Telephone Apparatus Manufacturing |
| 3661 | Telephone and Telegraph Apparatus | 334418 | Printed Circuit Assembly (Electronic Assembly) Manufacturing |
| 3663 | Radio and T.v. Communications Equipment | 334220 | Radio and Television Broadcasting and Wireless Communications Equipment Manufacturing |
| 3663 | Radio and T.v. Communications Equipment | 334515 | Instrument Manufacturing for Measuring and Testing Electricity and Electrical Signals |
| 3669 | Communications Equipment, Nec | 334290 | Other Communications Equipment Manufacturing |
| 3671 | Electron Tubes | 334419 | Other Electronic Component Manufacturing |
| 3672 | Printed Circuit Boards | 334412 | Bare Printed Circuit Board Manufacturing |
| 3674 | Semiconductors and Related Devices | 334413 | Semiconductor and Related Device Manufacturing |
| 3675 | Electronic Capacitors | 334416 | Capacitor, Resistor, Coil, Transformer, and Other Inductor Manufacturing |
| 3676 | Electronic Resistors | 334416 | Capacitor, Resistor, Coil, Transformer, and Other Inductor Manufacturing |

| SIC | SIC Title | 2022 NAICS | 2022 NAICS Title |
|------------|--|-------------------|---|
| 3677 | Electronic Coils and Transformers | 334416 | Capacitor, Resistor, Coil, Transformer, and Other Inductor Manufacturing |
| 3678 | Electronic Connectors | 334417 | Electronic Connector Manufacturing |
| 3679 | Electronic Components, Nec | 334220 | Radio and Television Broadcasting and Wireless Communications Equipment Manufacturing |
| 3679 | Electronic Components, Nec | 334310 | Audio and Video Equipment Manufacturing |
| 3679 | Electronic Components, Nec | 334418 | Printed Circuit Assembly (Electronic Assembly) Manufacturing |
| 3679 | Electronic Components, Nec | 334419 | Other Electronic Component Manufacturing |
| 3679 | Electronic Components, Nec | 334515 | Instrument Manufacturing for Measuring and Testing Electricity and Electrical Signals |
| 3691 | Storage Batteries | 335910 | Battery Manufacturing |
| 3692 | Primary Batteries, Dry and Wet | 335910 | Battery Manufacturing |
| 3694 | Engine Electrical Equipment | 336320 | Motor Vehicle Electrical and Electronic Equipment Manufacturing |
| 3695 | Magnetic and Optical Recording Media | 334610 | Manufacturing and Reproducing Magnetic and Optical Media |
| 3699 | Electrical Equipment and Supplies, Nec | 333310 | Commercial and Service Industry Machinery Manufacturing |
| 3699 | Electrical Equipment and Supplies, Nec | 333618 | Other Engine Equipment Manufacturing |
| 3699 | Electrical Equipment and Supplies, Nec | 333992 | Welding and Soldering Equipment Manufacturing |
| 3699 | Electrical Equipment and Supplies, Nec | 335139 | Electric Lamp Bulb and Other Lighting Equipment Manufacturing |
| 3699 | Electrical Equipment and Supplies, Nec | 335999 | All Other Miscellaneous Electrical Equipment and Component Manufacturing |
| 3711 | Motor Vehicles and Car Bodies | 336110 | Automobile and Light Duty Motor Vehicle Manufacturing |

| SIC | SIC Title | 2022 NAICS | 2022 NAICS Title |
|------------|--|-------------------|--|
| 3711 | Motor Vehicles and Car Bodies | 336110 | Automobile and Light Duty Motor Vehicle Manufacturing |
| 3711 | Motor Vehicles and Car Bodies | 336120 | Heavy Duty Truck Manufacturing |
| 3711 | Motor Vehicles and Car Bodies | 336211 | Motor Vehicle Body Manufacturing |
| 3711 | Motor Vehicles and Car Bodies | 336992 | Military Armored Vehicle, Tank, and Tank Component Manufacturing |
| 3713 | Truck and Bus Bodies | 336211 | Motor Vehicle Body Manufacturing |
| 3714 | Motor Vehicle Parts and Accessories | 336211 | Motor Vehicle Body Manufacturing |
| 3714 | Motor Vehicle Parts and Accessories | 336310 | Motor Vehicle Gasoline Engine and Engine Parts Manufacturing |
| 3714 | Motor Vehicle Parts and Accessories | 336320 | Motor Vehicle Electrical and Electronic Equipment Manufacturing |
| 3714 | Motor Vehicle Parts and Accessories | 336330 | Motor Vehicle Steering and Suspension Components (except Spring) Manufacturing |
| 3714 | Motor Vehicle Parts and Accessories | 336340 | Motor Vehicle Brake System Manufacturing |
| 3714 | Motor Vehicle Parts and Accessories | 336350 | Motor Vehicle Transmission and Power Train Parts Manufacturing |
| 3714 | Motor Vehicle Parts and Accessories | 336390 | Other Motor Vehicle Parts Manufacturing |
| 3715 | Truck Trailers | 336212 | Truck Trailer Manufacturing |
| 3716 | Motor Homes | 336213 | Motor Home Manufacturing |
| 3721 | Aircraft | 336411 | Aircraft Manufacturing |
| 3721 | Aircraft (research and development not producing prototypes) | 541713 | Research and Development in Nanotechnology |
| 3724 | Aircraft Engines and Engine Parts | 336412 | Aircraft Engine and Engine Parts Manufacturing |

| SIC | SIC Title | 2022 NAICS | 2022 NAICS Title |
|------------|---|-------------------|--|
| 3724 | Aircraft Engines and Engine Parts (research and development not producing prototypes) | 541713 | Research and Development in Nanotechnology |
| 3728 | Aircraft Parts and Equipment, Nec | 332912 | Fluid Power Valve and Hose Fitting Manufacturing |
| 3728 | Aircraft Parts and Equipment, Nec | 336411 | Aircraft Manufacturing |
| 3728 | Aircraft Parts and Equipment, Nec | 336413 | Other Aircraft Parts and Auxiliary Equipment Manufacturing |
| 3728 | Aircraft Parts and Auxiliary Equipment, NEC (research and development not producing prototypes) | 541713 | Research and Development in Nanotechnology |
| 3731 | Shipbuilding and Repairing | 336611 | Ship Building and Repairing |
| 3731 | Shipbuilding and Repairing | 488390 | Other Support Activities for Water Transportation |
| 3732 | Boatbuilding and Repairing | 336612 | Boat Building |
| 3732 | Boatbuilding and Repairing | 811490 | Other Personal and Household Goods Repair and Maintenance |
| 3743 | Railroad Equipment | 333914 | Measuring, Dispensing, and Other Pumping Equipment Manufacturing |
| 3743 | Railroad Equipment | 336510 | Railroad Rolling Stock Manufacturing |
| 3751 | Motorcycles, Bicycles, and Parts | 336991 | Motorcycle, Bicycle, and Parts Manufacturing |
| 3761 | Guided Missiles and Space Vehicles | 336414 | Guided Missile and Space Vehicle Manufacturing |
| 3761 | Guided Missiles and Space Vehicles (research and development not producing prototypes) | 541713 | Research and Development in Nanotechnology |
| 3764 | Space Propulsion Units and Parts | 336415 | Guided Missile and Space Vehicle Propulsion Unit and Propulsion Unit Parts Manufacturing |

| SIC | SIC Title | 2022 NAICS | 2022 NAICS Title |
|------------|--|-------------------|---|
| 3764 | Space Propulsion Units and Parts (research and development not producing prototypes) | 541713 | Research and Development in Nanotechnology |
| 3769 | Space Vehicle Equipment, Nec | 336419 | Other Guided Missile and Space Vehicle Parts and Auxiliary Equipment Manufacturing |
| 3769 | Space Vehicle Equipment, Nec (research and development not producing prototypes) | 541713 | Research and Development in Nanotechnology |
| 3792 | Travel Trailers and Campers | 336214 | Travel Trailer and Camper Manufacturing |
| 3795 | Tanks and Tank Components | 336992 | Military Armored Vehicle, Tank, and Tank Component Manufacturing |
| 3799 | Transportation Equipment, Nec | 333924 | Industrial Truck, Tractor, Trailer, and Stacker Machinery Manufacturing |
| 3799 | Transportation Equipment, Nec | 336214 | Travel Trailer and Camper Manufacturing |
| 3799 | Transportation Equipment, Nec | 336390 | Other Motor Vehicle Parts Manufacturing |
| 3799 | Transportation Equipment, Nec | 336999 | All Other Transportation Equipment Manufacturing |
| 3812 | Search and Navigation Equipment | 334511 | Search, Detection, Navigation, Guidance, Aeronautical, and Nautical System and Instrument Manufacturing |
| 3821 | Laboratory Apparatus and Furniture | 333248 | All Other Industrial Machinery Manufacturing |
| 3821 | Laboratory Apparatus and Furniture | 333415 | Air-Conditioning and Warm Air Heating Equipment and Commercial and Industrial Refrigeration Equipment Manufacturing |
| 3821 | Laboratory Apparatus and Furniture | 333994 | Industrial Process Furnace and Oven Manufacturing |
| 3821 | Laboratory Apparatus and Furniture | 333998 | All Other Miscellaneous General Purpose Machinery Manufacturing |
| 3821 | Laboratory Apparatus and Furniture | 333998 | All Other Miscellaneous General Purpose Machinery Manufacturing |

| SIC | SIC Title | 2022 NAICS | 2022 NAICS Title |
|------------|--|-------------------|--|
| 3821 | Laboratory Apparatus and Furniture | 337127 | Institutional Furniture Manufacturing |
| 3821 | Laboratory Apparatus and Furniture | 339113 | Surgical Appliance and Supplies Manufacturing |
| 3822 | Environmental Controls | 334512 | Automatic Environmental Control Manufacturing for Residential, Commercial, and Appliance Use |
| 3823 | Process Control Instruments | 334513 | Instruments and Related Products Manufacturing for Measuring, Displaying, and Controlling Industrial Process Variables |
| 3824 | Fluid Meters and Counting Devices | 334514 | Totalizing Fluid Meter and Counting Device Manufacturing |
| 3825 | Instruments To Measure Electricity | 334514 | Totalizing Fluid Meter and Counting Device Manufacturing |
| 3825 | Instruments To Measure Electricity | 334515 | Instrument Manufacturing for Measuring and Testing Electricity and Electrical Signals |
| 3826 | Analytical Instruments | 334516 | Analytical Laboratory Instrument Manufacturing |
| 3827 | Optical Instruments and Lenses | 333310 | Commercial and Service Industry Machinery Manufacturing |
| 3829 | Measuring and Controlling Devices, Nec | 334514 | Totalizing Fluid Meter and Counting Device Manufacturing |
| 3829 | Measuring and Controlling Devices, Nec | 334519 | Other Measuring and Controlling Device Manufacturing |
| 3829 | Measuring and Controlling Devices, Nec | 334519 | Other Measuring and Controlling Device Manufacturing |
| 3829 | Measuring and Controlling Devices, Nec | 339112 | Surgical and Medical Instrument Manufacturing |
| 3841 | Surgical and Medical Instruments | 332994 | Small Arms, Ordnance, and Ordnance Accessories Manufacturing |
| 3841 | Surgical and Medical Instruments | 333248 | All Other Industrial Machinery Manufacturing |

| SIC | SIC Title | 2022 NAICS | 2022 NAICS Title |
|------------|-------------------------------------|-------------------|---|
| 3841 | Surgical and Medical Instruments | 333415 | Air-Conditioning and Warm Air Heating Equipment and Commercial and Industrial Refrigeration Equipment Manufacturing |
| 3841 | Surgical and Medical Instruments | 333994 | Industrial Process Furnace and Oven Manufacturing |
| 3841 | Surgical and Medical Instruments | 333998 | All Other Miscellaneous General Purpose Machinery Manufacturing |
| 3841 | Surgical and Medical Instruments | 333998 | All Other Miscellaneous General Purpose Machinery Manufacturing |
| 3841 | Surgical and Medical Instruments | 337127 | Institutional Furniture Manufacturing |
| 3841 | Surgical and Medical Instruments | 339112 | Surgical and Medical Instrument Manufacturing |
| 3841 | Surgical and Medical Instruments | 339113 | Surgical Appliance and Supplies Manufacturing |
| 3842 | Surgical Appliances and Supplies | 322291 | Sanitary Paper Product Manufacturing |
| 3842 | Surgical Appliances and Supplies | 334510 | Electromedical and Electrotherapeutic Apparatus Manufacturing |
| 3842 | Surgical Appliances and Supplies | 339113 | Surgical Appliance and Supplies Manufacturing |
| 3842 | Surgical Appliances and Supplies | 339999 | All Other Miscellaneous Manufacturing |
| 3843 | Dental Equipment and Supplies | 339114 | Dental Equipment and Supplies Manufacturing |
| 3844 | X-ray Apparatus and Tubes | 334517 | Irradiation Apparatus Manufacturing |
| 3845 | Electromedical Equipment | 334510 | Electromedical and Electrotherapeutic Apparatus Manufacturing |
| 3845 | Electromedical Equipment | 334517 | Irradiation Apparatus Manufacturing |
| 3851 | Ophthalmic Goods | 339113 | Surgical Appliance and Supplies Manufacturing |
| 3851 | Ophthalmic Goods | 339115 | Ophthalmic Goods Manufacturing |
| 3861 | Photographic Equipment and Supplies | 325992 | Photographic Film, Paper, Plate, Chemical, and Copy Toner Manufacturing |

| SIC | SIC Title | 2022 NAICS | 2022 NAICS Title |
|------------|--|-------------------|--|
| 3861 | Photographic Equipment and Supplies | 333310 | Commercial and Service Industry Machinery Manufacturing |
| 3873 | Watches, Clocks, Watchcases, and Parts | 334519 | Other Measuring and Controlling Device Manufacturing |
| 3911 | Jewelry, Precious Metal | 339910 | Jewelry and Silverware Manufacturing |
| 3914 | Silverware and Plated Ware | 332215 | Metal Kitchen Cookware, Utensil, Cutlery, and Flatware (except Precious) Manufacturing |
| 3914 | Silverware and Plated Ware | 332999 | All Other Miscellaneous Fabricated Metal Product Manufacturing |
| 3914 | Silverware and Plated Ware | 339910 | Jewelry and Silverware Manufacturing |
| 3915 | Jewelers' Materials and Lapidary Work | 334519 | Other Measuring and Controlling Device Manufacturing |
| 3915 | Jewelers' Materials and Lapidary Work | 339910 | Jewelry and Silverware Manufacturing |
| 3931 | Musical Instruments | 339992 | Musical Instrument Manufacturing |
| 3942 | Dolls and Stuffed Toys | 339930 | Doll, Toy, and Game Manufacturing |
| 3944 | Games, Toys, and Children's Vehicles | 336991 | Motorcycle, Bicycle, and Parts Manufacturing |
| 3944 | Games, Toys, and Children's Vehicles | 339930 | Doll, Toy, and Game Manufacturing |
| 3949 | Sporting and athletic Goods, Nec | 339920 | Sporting and Athletic Goods Manufacturing |
| 3951 | Pens and Mechanical Pencils | 339940 | Office Supplies (except Paper) Manufacturing |
| 3952 | Lead Pencils and Art Goods | 325998 | All Other Miscellaneous Chemical Product and Preparation Manufacturing |
| 3952 | Lead Pencils and Art Goods | 337127 | Institutional Furniture Manufacturing |
| 3952 | Lead Pencils and Art Goods | 339940 | Office Supplies (except Paper) Manufacturing |
| 3953 | Marking Devices | 339940 | Office Supplies (except Paper) Manufacturing |
| 3955 | Carbon Paper and Inked Ribbons | 339940 | Office Supplies (except Paper) Manufacturing |

| SIC | SIC Title | 2022 NAICS | 2022 NAICS Title |
|------------|---------------------------------------|-------------------|--|
| 3961 | Costume Jewelry | 339910 | Jewelry and Silverware Manufacturing |
| 3961 | Costume Jewelry | 339993 | Fastener, Button, Needle, and Pin Manufacturing |
| 3965 | Fasteners, Buttons, Needles, and Pins | 339993 | Fastener, Button, Needle, and Pin Manufacturing |
| 3991 | Brooms and Brushes | 339994 | Broom, Brush, and Mop Manufacturing |
| 3993 | Signs and Advertising Specialties | 323113 | Commercial Screen Printing |
| 3993 | Signs and Advertising Specialties | 339950 | Sign Manufacturing |
| 3995 | Burial Caskets | 339995 | Burial Casket Manufacturing |
| 3996 | Hard Surface Floor Coverings, Nec | 326199 | All Other Plastics Product Manufacturing |
| 3999 | Manufacturing Industries, Nec | 316110 | Leather and Hide Tanning and Finishing |
| 3999 | Manufacturing Industries, Nec | 321999 | All Other Miscellaneous Wood Product Manufacturing |
| 3999 | Manufacturing Industries, Nec | 325998 | All Other Miscellaneous Chemical Product and Preparation Manufacturing |
| 3999 | Manufacturing Industries, Nec | 326199 | All Other Plastics Product Manufacturing |
| 3999 | Manufacturing Industries, Nec | 332215 | Metal Kitchen Cookware, Utensil, Cutlery, and Flatware (except Precious) Manufacturing |
| 3999 | Manufacturing Industries, Nec | 332216 | Saw Blade and Handtool Manufacturing |
| 3999 | Manufacturing Industries, Nec | 332812 | Metal Coating, Engraving (except Jewelry and Silverware), and Allied Services to Manufacturers |
| 3999 | Manufacturing Industries, Nec | 332999 | All Other Miscellaneous Fabricated Metal Product Manufacturing |
| 3999 | Manufacturing Industries, Nec | 333310 | Commercial and Service Industry Machinery Manufacturing |
| 3999 | Manufacturing Industries, Nec | 335131 | Residential Electric Lighting Fixture Manufacturing |
| 3999 | Manufacturing Industries, Nec | 335210 | Small Electrical Appliance Manufacturing |

| SIC | SIC Title | 2022 NAICS | 2022 NAICS Title |
|------------|---|-------------------|--|
| 3999 | Manufacturing Industries, Nec | 336612 | Boat Building |
| 3999 | Manufacturing Industries, Nec | 337127 | Institutional Furniture Manufacturing |
| 3999 | Manufacturing Industries, Nec | 339930 | Doll, Toy, and Game Manufacturing |
| 3999 | Manufacturing Industries, Nec | 339999 | All Other Miscellaneous Manufacturing |
| 4011 | Railroads, Line-haul Operating | 482111 | Line-Haul Railroads |
| 4013 | Switching and Terminal Services | 482112 | Short Line Railroads |
| 4013 | Switching and Terminal Services | 488210 | Support Activities for Rail Transportation |
| 4412 | Deep Sea Foreign Transportation of Freight | 483111 | Deep Sea Freight Transportation |
| 4424 | Deep Sea Domestic Transportation of Freight | 483113 | Coastal and Great Lakes Freight Transportation |
| 4432 | Freight Transportation On The Great Lakes | 483113 | Coastal and Great Lakes Freight Transportation |
| 4449 | Water Transportation of Freight | 483211 | Inland Water Freight Transportation |
| 4481 | Deep Sea Passenger Transportation, Except Ferry | 483112 | Deep Sea Passenger Transportation |
| 4481 | Deep Sea Passenger Transportation, Except Ferry | 483114 | Coastal and Great Lakes Passenger Transportation |
| 4482 | Ferries | 483114 | Coastal and Great Lakes Passenger Transportation |
| 4482 | Ferries | 483212 | Inland Water Passenger Transportation |
| 4489 | Water Passenger Transportation | 483212 | Inland Water Passenger Transportation |
| 4489 | Water Passenger Transportation | 487210 | Scenic and Sightseeing Transportation, Water |
| 4491 | Marine Cargo Handling | 488310 | Port and Harbor Operations |
| 4491 | Marine Cargo Handling | 488320 | Marine Cargo Handling |
| 4492 | Towing and Tugboat Service | 488330 | Navigational Services to Shipping |
| 4493 | Marinas | 713930 | Marinas |

| SIC | SIC Title | 2022 NAICS | 2022 NAICS Title |
|------------|---------------------------------------|-------------------|---|
| 4499 | Water Transportation Services, Nec | 483211 | Inland Water Freight Transportation |
| 4499 | Water Transportation Services, Nec | 488310 | Port and Harbor Operations |
| 4499 | Water Transportation Services, Nec | 488330 | Navigational Services to Shipping |
| 4499 | Water Transportation Services, Nec | 488390 | Other Support Activities for Water Transportation |
| 4499 | Water Transportation Services, Nec | 532411 | Commercial Air, Rail, and Water Transportation Equipment Rental and Leasing |
| 4499 | Water Transportation Services, Nec | 541990 | All Other Professional, Scientific, and Technical Services |
| 4512 | Air Transportation, Scheduled | 481111 | Scheduled Passenger Air Transportation |
| 4512 | Air Transportation, Scheduled | 481112 | Scheduled Freight Air Transportation |
| 4513 | Air Courier Services | 492110 | Couriers and Express Delivery Services |
| 4522 | Air Transportation, Nonscheduled | 481211 | Nonscheduled Chartered Passenger Air Transportation |
| 4522 | Air Transportation, Nonscheduled | 481212 | Nonscheduled Chartered Freight Air Transportation |
| 4522 | Air Transportation, Nonscheduled | 481219 | Other Nonscheduled Air Transportation |
| 4522 | Air Transportation, Nonscheduled | 487990 | Scenic and Sightseeing Transportation, Other |
| 4522 | Air Transportation, Nonscheduled | 621910 | Ambulance Services |
| 4581 | Airports, Flying Fields, and Services | 488111 | Air Traffic Control |
| 4581 | Airports, Flying Fields, and Services | 488119 | Other Airport Operations |
| 4581 | Airports, Flying Fields, and Services | 488190 | Other Support Activities for Air Transportation |
| 4581 | Airports, Flying Fields, and Services | 561720 | Janitorial Services |

| SIC | SIC Title | 2022 NAICS | 2022 NAICS Title |
|------------|---------------------------------------|-------------------|---|
| 4581 | Airports, Flying Fields, and Services | 811420 | Reupholstery and Furniture Repair |
| 4612 | Crude Petroleum Pipelines | 486110 | Pipeline Transportation of Crude Oil |
| 4613 | Refined Petroleum Pipelines | 486910 | Pipeline Transportation of Refined Petroleum Products |
| 4619 | Pipelines, Nec | 486990 | All Other Pipeline Transportation |
| 4724 | Travel Agencies | 561510 | Travel Agencies |
| 4725 | Tour Operators | 561520 | Tour Operators |
| 4729 | Passenger Transportation Arrangement | 488999 | All Other Support Activities for Transportation |
| 4729 | Passenger Transportation Arrangement | 561599 | All Other Travel Arrangement and Reservation Services |
| 4731 | Freight Transportation Arrangement | 488510 | Freight Transportation Arrangement |
| 4731 | Freight Transportation Arrangement | 541614 | Process, Physical Distribution, and Logistics Consulting Services |
| 4741 | Rental of Railroad Cars | 488210 | Support Activities for Rail Transportation |
| 4741 | Rental of Railroad Cars | 532411 | Commercial Air, Rail, and Water Transportation Equipment Rental and Leasing |
| 4783 | Packing and Crating | 488991 | Packing and Crating |
| 4785 | Inspection and Fixed Facilities | 488390 | Other Support Activities for Water Transportation |
| 4785 | Inspection and Fixed Facilities | 488490 | Other Support Activities for Road Transportation |
| 4789 | Transportation Services, Nec | 487110 | Scenic and Sightseeing Transportation, Land |
| 4789 | Transportation Services, Nec | 488210 | Support Activities for Rail Transportation |
| 4789 | Transportation Services, Nec | 488999 | All Other Support Activities for Transportation |
| 4789 | Transportation Services, Nec | 722310 | Food Service Contractors |

| SIC | SIC Title | 2022 NAICS | 2022 NAICS Title |
|------------|---|-------------------|--|
| 4812 | Radiotelephone Communication | 517112 | Wireless Telecommunications Carriers (except Satellite) |
| 4812 | Radiotelephone Communication | 517121 | Telecommunications Resellers |
| 4813 | Telephone Communications, Except Radiotelephone | 517111 | Wired Telecommunications Carriers |
| 4813 | Telephone Communication, Except Radio | 517121 | Telecommunications Resellers |
| 4813 | Telephone Communication, Except Radio | 517122 | Agents for Wireless Telecommunications Services |
| 4822 | Telegraph and Other Message Communications | 517111 | Wired Telecommunications Carriers |
| 4822 | Telegraph and Other Communications | 517122 | Agents for Wireless Telecommunications Services |
| 4832 | Radio Broadcasting Stations | 516110 | Radio Broadcasting Stations |
| 4832 | Radio Broadcasting Stations | 516210 | Media Streaming Distribution Services, Social Networks, and Other Media Networks and Content Providers |
| 4833 | Television Broadcasting Stations | 516120 | Television Broadcasting Stations |
| 4841 | Cable and Other Pay Television Services | 516210 | Media Streaming Distribution Services, Social Networks, and Other Media Networks and Content Providers |
| 4841 | Cable and Other Pay Television Services | 517111 | Wired Telecommunications Carriers |
| 4841 | Cable and Other Pay Television Services | 517122 | Agents for Wireless Telecommunications Services |
| 4899 | Communication Services, Nec | 485310 | Taxi and Ridesharing Services |
| 4899 | Communication Services, Nec | 517112 | Wireless Telecommunications Carriers (except Satellite) |
| 4899 | Communication Services, Nec | 517410 | Satellite Telecommunications |
| 4899 | Communication Services, Nec | 517810 | All Other Telecommunications |

| SIC | SIC Title | 2022 NAICS | 2022 NAICS Title |
|------------|--------------------------------------|-------------------|--|
| 4899 | Communication Services, Nec | 812990 | All Other Personal Services |
| 4911 | Electric Services | 221111 | Hydroelectric Power Generation |
| 4911 | Electric Services | 221112 | Fossil Fuel Electric Power Generation |
| 4911 | Electric Services | 221113 | Nuclear Electric Power Generation |
| 4911 | Electric Services | 221114 | Solar Electric Power Generation |
| 4911 | Electric Services | 221115 | Wind Electric Power Generation |
| 4911 | Electric Services | 221116 | Geothermal Electric Power Generation |
| 4911 | Electric Services | 221117 | Biomass Electric Power Generation |
| 4911 | Electric Services | 221118 | Other Electric Power Generation |
| 4911 | Electric Services | 221121 | Electric Bulk Power Transmission and Control |
| 4911 | Electric Services | 221122 | Electric Power Distribution |
| 4922 | Natural Gas Transmission | 486210 | Pipeline Transportation of Natural Gas |
| 4923 | Gas Transmission and Distribution | 221210 | Natural Gas Distribution |
| 4923 | Gas Transmission and Distribution | 486210 | Pipeline Transportation of Natural Gas |
| 4924 | Natural Gas Distribution | 221210 | Natural Gas Distribution |
| 4925 | Gas Production and/or Distribution | 221210 | Natural Gas Distribution |
| 4931 | Electric and Other Services Combined | 221111 | Hydroelectric Power Generation |
| 4931 | Electric and Other Services Combined | 221112 | Fossil Fuel Electric Power Generation |
| 4931 | Electric and Other Services Combined | 221113 | Nuclear Electric Power Generation |
| 4931 | Electric and Other Services Combined | 221114 | Solar Electric Power Generation |
| 4931 | Electric and Other Services Combined | 221115 | Wind Electric Power Generation |

| SIC | SIC Title | 2022 NAICS | 2022 NAICS Title |
|------------|--------------------------------------|-------------------|--|
| 4931 | Electric and Other Services Combined | 221116 | Geothermal Electric Power Generation |
| 4931 | Electric and Other Services Combined | 221117 | Biomass Electric Power Generation |
| 4931 | Electric and Other Services Combined | 221118 | Other Electric Power Generation |
| 4931 | Electric and Other Services Combined | 221121 | Electric Bulk Power Transmission and Control |
| 4931 | Electric and Other Services Combined | 221122 | Electric Power Distribution |
| 4931 | Electric and Other Services Combined | 221210 | Natural Gas Distribution |
| 4932 | Gas and Other Services Combined | 221210 | Natural Gas Distribution |
| 4939 | Combination Utilities, Nec | 221111 | Hydroelectric Power Generation |
| 4939 | Combination Utilities, Nec | 221112 | Fossil Fuel Electric Power Generation |
| 4939 | Combination Utilities, Nec | 221113 | Nuclear Electric Power Generation |
| 4939 | Combination Utilities, Nec | 221114 | Solar Electric Power Generation |
| 4939 | Combination Utilities, Nec | 221115 | Wind Electric Power Generation |
| 4939 | Combination Utilities, Nec | 221116 | Geothermal Electric Power Generation |
| 4939 | Combination Utilities, Nec | 221117 | Biomass Electric Power Generation |
| 4939 | Combination Utilities, Nec | 221118 | Other Electric Power Generation |
| 4939 | Combination Utilities, Nec | 221121 | Electric Bulk Power Transmission and Control |
| 4939 | Combination Utilities, Nec | 221122 | Electric Power Distribution |
| 4939 | Combination Utilities, Nec | 221210 | Natural Gas Distribution |
| 4941 | Water Supply | 221310 | Water Supply and Irrigation Systems |
| 4952 | Sewerage Systems | 221320 | Sewage Treatment Facilities |
| 4953 | Refuse Systems | 562211 | Hazardous Waste Treatment and Disposal |

| SIC | SIC Title | 2022 NAICS | 2022 NAICS Title |
|------------|--------------------------------------|-------------------|---|
| 4953 | Refuse Systems | 562212 | Solid Waste Landfill |
| 4953 | Refuse Systems | 562213 | Solid Waste Combustors and Incinerators |
| 4953 | Refuse Systems | 562219 | Other Nonhazardous Waste Treatment and Disposal |
| 4953 | Refuse Systems | 562920 | Materials Recovery Facilities |
| 4959 | Sanitary Services, Nec | 488119 | Other Airport Operations |
| 4959 | Sanitary Services, Nec | 488490 | Other Support Activities for Road Transportation |
| 4959 | Sanitary Services, Nec | 561710 | Exterminating and Pest Control Services |
| 4959 | Sanitary Services, Nec | 561790 | Other Services to Buildings and Dwellings |
| 4959 | Sanitary Services, Nec | 562910 | Remediation Services |
| 4959 | Sanitary Services, Nec | 562998 | All Other Miscellaneous Waste Management Services |
| 4961 | Steam and Air-conditioning Supply | 221330 | Steam and Air-Conditioning Supply |
| 4971 | Irrigation Systems | 221310 | Water Supply and Irrigation Systems |
| 5012 | Automobiles and Other Motor Vehicles | 423110 | Automobile and Other Motor Vehicle Merchant Wholesalers |
| 5012 | Automobiles and Other Motor Vehicles | 425120 | Wholesale Trade Agents and Brokers |
| 5012 | Automobiles and Other Motor Vehicles | 425120 | Wholesale Trade Agents and Brokers |
| 5013 | Motor Vehicle Supplies and New Parts | 423120 | Motor Vehicle Supplies and New Parts Merchant Wholesalers |
| 5013 | Motor Vehicle Supplies and New Parts | 425120 | Wholesale Trade Agents and Brokers |
| 5013 | Motor Vehicle Supplies and New Parts | 425120 | Wholesale Trade Agents and Brokers |
| 5013 | Motor Vehicle Supplies and New Parts | 441330 | Automotive Parts and Accessories Retailers |

| SIC | SIC Title | 2022 NAICS | 2022 NAICS Title |
|------------|------------------------------------|-------------------|--|
| 5014 | Tires and Tubes | 423130 | Tire and Tube Merchant Wholesalers |
| 5014 | Tires and Tubes | 425120 | Wholesale Trade Agents and Brokers |
| 5014 | Tires and Tubes | 425120 | Wholesale Trade Agents and Brokers |
| 5014 | Tires and Tubes | 441340 | Tire Dealers |
| 5015 | Motor Vehicle Parts, Used | 423140 | Motor Vehicle Parts (Used) Merchant Wholesalers |
| 5015 | Motor Vehicle Parts, Used | 425120 | Wholesale Trade Agents and Brokers |
| 5015 | Motor Vehicle Parts, Used | 425120 | Wholesale Trade Agents and Brokers |
| 5015 | Motor Vehicle Parts, Used | 441330 | Automotive Parts and Accessories Retailers |
| 5021 | Furniture | 423210 | Furniture Merchant Wholesalers |
| 5021 | Furniture | 425120 | Wholesale Trade Agents and Brokers |
| 5021 | Furniture | 425120 | Wholesale Trade Agents and Brokers |
| 5021 | Furniture | 449110 | Furniture Retailers |
| 5023 | Homefurnishings | 423220 | Home Furnishing Merchant Wholesalers |
| 5023 | Homefurnishings | 425120 | Wholesale Trade Agents and Brokers |
| 5023 | Homefurnishings | 425120 | Wholesale Trade Agents and Brokers |
| 5023 | Homefurnishings | 449121 | Floor Covering Retailers |
| 5031 | Lumber, Plywood, and Millwork | 423310 | Lumber, Plywood, Millwork, and Wood Panel Merchant Wholesalers |
| 5031 | Lumber, Plywood, and Millwork | 425120 | Wholesale Trade Agents and Brokers |
| 5031 | Lumber, Plywood, and Millwork | 425120 | Wholesale Trade Agents and Brokers |
| 5031 | Lumber, Plywood, and Millwork | 444110 | Home Centers |
| 5032 | Brick, Stone, and Related Material | 423320 | Brick, Stone, and Related Construction Material Merchant Wholesalers |
| 5032 | Brick, Stone, and Related Material | 425120 | Wholesale Trade Agents and Brokers |
| 5032 | Brick, Stone, and Related Material | 425120 | Wholesale Trade Agents and Brokers |

| SIC | SIC Title | 2022 NAICS | 2022 NAICS Title |
|------------|--------------------------------------|-------------------|--|
| 5032 | Brick, Stone, and Related Material | 444180 | Other Building Material Dealers |
| 5033 | Roofing, Siding, and Insulation | 423330 | Roofing, Siding, and Insulation Material Merchant Wholesalers |
| 5033 | Roofing, Siding, and Insulation | 425120 | Wholesale Trade Agents and Brokers |
| 5033 | Roofing, Siding, and Insulation | 425120 | Wholesale Trade Agents and Brokers |
| 5033 | Roofing, Siding, and Insulation | 444180 | Other Building Material Dealers |
| 5039 | Construction Materials, Nec | 423310 | Lumber, Plywood, Millwork, and Wood Panel Merchant Wholesalers |
| 5039 | Construction Materials, Nec | 423390 | Other Construction Material Merchant Wholesalers |
| 5039 | Construction Materials, Nec | 425120 | Wholesale Trade Agents and Brokers |
| 5039 | Construction Materials, Nec | 425120 | Wholesale Trade Agents and Brokers |
| 5039 | Construction Materials, Nec | 444180 | Other Building Material Dealers |
| 5043 | Photographic Equipment and Supplies | 423410 | Photographic Equipment and Supplies Merchant Wholesalers |
| 5043 | Photographic Equipment and Supplies | 425120 | Wholesale Trade Agents and Brokers |
| 5043 | Photographic Equipment and Supplies | 425120 | Wholesale Trade Agents and Brokers |
| 5044 | Office Equipment | 423420 | Office Equipment Merchant Wholesalers |
| 5044 | Office Equipment | 425120 | Wholesale Trade Agents and Brokers |
| 5044 | Office Equipment | 425120 | Wholesale Trade Agents and Brokers |
| 5044 | Office Equipment | 459410 | Office Supplies and Stationery Retailers |
| 5045 | Computers, Peripherals, and Software | 423430 | Computer and Computer Peripheral Equipment and Software Merchant Wholesalers |
| 5045 | Computers, Peripherals, and Software | 425120 | Wholesale Trade Agents and Brokers |

| SIC | SIC Title | 2022 NAICS | 2022 NAICS Title |
|------------|--------------------------------------|-------------------|---|
| 5045 | Computers, Peripherals, and Software | 425120 | Wholesale Trade Agents and Brokers |
| 5045 | Computers, Peripherals, and Software | 449210 | Electronics and Appliance Retailers |
| 5046 | Commercial Equipment, Nec | 423440 | Other Commercial Equipment Merchant Wholesalers |
| 5046 | Commercial Equipment, Nec | 425120 | Wholesale Trade Agents and Brokers |
| 5046 | Commercial Equipment, Nec | 425120 | Wholesale Trade Agents and Brokers |
| 5047 | Medical and Hospital Equipment | 423450 | Medical, Dental, and Hospital Equipment and Supplies Merchant Wholesalers |
| 5047 | Medical and Hospital Equipment | 425120 | Wholesale Trade Agents and Brokers |
| 5047 | Medical and Hospital Equipment | 425120 | Wholesale Trade Agents and Brokers |
| 5047 | Medical and Hospital Equipment | 456199 | All Other Health and Personal Care Retailers |
| 5048 | Ophthalmic Goods | 423460 | Ophthalmic Goods Merchant Wholesalers |
| 5048 | Ophthalmic Goods | 425120 | Wholesale Trade Agents and Brokers |
| 5048 | Ophthalmic Goods | 425120 | Wholesale Trade Agents and Brokers |
| 5049 | Professional Equipment, Nec | 423490 | Other Professional Equipment and Supplies Merchant Wholesalers |
| 5049 | Professional Equipment, Nec | 425120 | Wholesale Trade Agents and Brokers |
| 5049 | Professional Equipment, Nec | 425120 | Wholesale Trade Agents and Brokers |
| 5049 | Professional Equipment, Nec | 459410 | Office Supplies and Stationery Retailers |
| 5051 | Metals Service Centers and Offices | 423510 | Metal Service Centers and Other Metal Merchant Wholesalers |
| 5051 | Metals Service Centers and Offices | 425120 | Wholesale Trade Agents and Brokers |
| 5051 | Metals Service Centers and Offices | 425120 | Wholesale Trade Agents and Brokers |

| SIC | SIC Title | 2022 NAICS | 2022 NAICS Title |
|------------|---|-------------------|---|
| 5052 | Coal and Other Minerals and Ores | 423520 | Coal and Other Mineral and Ore Merchant Wholesalers |
| 5052 | Coal and Other Minerals and Ores | 425120 | Wholesale Trade Agents and Brokers |
| 5052 | Coal and Other Minerals and Ores | 425120 | Wholesale Trade Agents and Brokers |
| 5063 | Electrical Apparatus and Equipment | 423610 | Electrical Apparatus and Equipment, Wiring Supplies, and Related Equipment Merchant Wholesalers |
| 5063 | Electrical Apparatus and Equipment | 425120 | Wholesale Trade Agents and Brokers |
| 5063 | Electrical Apparatus and Equipment | 425120 | Wholesale Trade Agents and Brokers |
| 5063 | Electrical Apparatus and Equipment | 444180 | Other Building Material Dealers |
| 5064 | Electrical Appliances, Television and Radio | 423620 | Household Appliances, Electric Housewares, and Consumer Electronics Merchant Wholesalers |
| 5064 | Electrical Appliances, Television and Radio | 423720 | Plumbing and Heating Equipment and Supplies (Hydronics) Merchant Wholesalers |
| 5064 | Electrical Appliances, Television and Radio | 425120 | Wholesale Trade Agents and Brokers |
| 5064 | Electrical Appliances, Television and Radio | 425120 | Wholesale Trade Agents and Brokers |
| 5064 | Electrical Appliances, Television and Radio | 444180 | Other Building Material Dealers |
| 5064 | Electrical Appliances, Television and Radio | 449210 | Electronics and Appliance Retailers |
| 5064 | Electrical Appliances, Television and Radio | 449210 | Electronics and Appliance Retailers |
| 5065 | Electronic Parts and Equipment, Nec | 423690 | Other Electronic Parts and Equipment Merchant Wholesalers |
| 5065 | Electronic Parts and Equipment, Nec | 425120 | Wholesale Trade Agents and Brokers |

| SIC | SIC Title | 2022 NAICS | 2022 NAICS Title |
|------------|--|-------------------|--|
| 5065 | Electronic Parts and Equipment, Nec | 425120 | Wholesale Trade Agents and Brokers |
| 5065 | Electronic Parts and Equipment, Nec | 449210 | Electronics and Appliance Retailers |
| 5065 | Electronic Parts and Equipment, Nec | 449210 | Electronics and Appliance Retailers |
| 5072 | Hardware | 423710 | Hardware Merchant Wholesalers |
| 5072 | Hardware | 425120 | Wholesale Trade Agents and Brokers |
| 5072 | Hardware | 425120 | Wholesale Trade Agents and Brokers |
| 5072 | Hardware | 444140 | Hardware Retailers |
| 5074 | Plumbing and Hydronic Heating Supplies | 423620 | Household Appliances, Electric Housewares, and Consumer Electronics Merchant Wholesalers |
| 5074 | Plumbing and Hydronic Heating Supplies | 423720 | Plumbing and Heating Equipment and Supplies (Hydronics) Merchant Wholesalers |
| 5074 | Plumbing and Hydronic Heating Supplies | 425120 | Wholesale Trade Agents and Brokers |
| 5074 | Plumbing and Hydronic Heating Supplies | 425120 | Wholesale Trade Agents and Brokers |
| 5074 | Plumbing and Hydronic Heating Supplies | 444180 | Other Building Material Dealers |
| 5075 | Warm Air Heating and Air Conditioning | 423730 | Warm Air Heating and Air-Conditioning Equipment and Supplies Merchant Wholesalers |
| 5075 | Warm Air Heating and Air Conditioning | 425120 | Wholesale Trade Agents and Brokers |
| 5075 | Warm Air Heating and Air Conditioning | 425120 | Wholesale Trade Agents and Brokers |
| 5078 | Refrigeration Equipment and Supplies | 423740 | Refrigeration Equipment and Supplies Merchant Wholesalers |

| SIC | SIC Title | 2022 NAICS | 2022 NAICS Title |
|------------|--------------------------------------|-------------------|--|
| 5078 | Refrigeration Equipment and Supplies | 425120 | Wholesale Trade Agents and Brokers |
| 5078 | Refrigeration Equipment and Supplies | 425120 | Wholesale Trade Agents and Brokers |
| 5082 | Construction and Mining Machinery | 423810 | Construction and Mining (except Oil Well) Machinery and Equipment Merchant Wholesalers |
| 5082 | Construction and Mining Machinery | 425120 | Wholesale Trade Agents and Brokers |
| 5082 | Construction and Mining Machinery | 425120 | Wholesale Trade Agents and Brokers |
| 5083 | Farm and Garden Machinery | 423820 | Farm and Garden Machinery and Equipment Merchant Wholesalers |
| 5083 | Farm and Garden Machinery | 425120 | Wholesale Trade Agents and Brokers |
| 5083 | Farm and Garden Machinery | 425120 | Wholesale Trade Agents and Brokers |
| 5083 | Farm and Garden Machinery | 444230 | Outdoor Power Equipment Retailers |
| 5084 | Industrial Machinery and Equipment | 423830 | Industrial Machinery and Equipment Merchant Wholesalers |
| 5084 | Industrial Machinery and Equipment | 425120 | Wholesale Trade Agents and Brokers |
| 5084 | Industrial Machinery and Equipment | 425120 | Wholesale Trade Agents and Brokers |
| 5085 | Industrial Supplies | 423830 | Industrial Machinery and Equipment Merchant Wholesalers |
| 5085 | Industrial Supplies | 423840 | Industrial Supplies Merchant Wholesalers |
| 5085 | Industrial Supplies | 425120 | Wholesale Trade Agents and Brokers |
| 5085 | Industrial Supplies | 425120 | Wholesale Trade Agents and Brokers |
| 5085 | Industrial Supplies | 459999 | All Other Miscellaneous Retailers |
| 5087 | Service Establishment Equipment | 423850 | Service Establishment Equipment and Supplies Merchant Wholesalers |

| SIC | SIC Title | 2022 NAICS | 2022 NAICS Title |
|------------|---------------------------------------|-------------------|---|
| 5087 | Service Establishment Equipment | 425120 | Wholesale Trade Agents and Brokers |
| 5087 | Service Establishment Equipment | 425120 | Wholesale Trade Agents and Brokers |
| 5087 | Service Establishment Equipment | 456120 | Cosmetics, Beauty Supplies, and Perfume Retailers |
| 5088 | Transportation Equipment and Supplies | 423860 | Transportation Equipment and Supplies (except Motor Vehicle) Merchant Wholesalers |
| 5088 | Transportation Equipment and Supplies | 425120 | Wholesale Trade Agents and Brokers |
| 5088 | Transportation Equipment and Supplies | 425120 | Wholesale Trade Agents and Brokers |
| 5091 | Sporting and Recreation Goods | 423910 | Sporting and Recreational Goods and Supplies Merchant Wholesalers |
| 5091 | Sporting and Recreation Goods | 425120 | Wholesale Trade Agents and Brokers |
| 5091 | Sporting and Recreation Goods | 425120 | Wholesale Trade Agents and Brokers |
| 5091 | Sporting and Recreation Goods | 459110 | Sporting Goods Retailers |
| 5092 | Toys and Hobby Goods and Supplies | 423920 | Toy and Hobby Goods and Supplies Merchant Wholesalers |
| 5092 | Toys and Hobby Goods and Supplies | 425120 | Wholesale Trade Agents and Brokers |
| 5092 | Toys and Hobby Goods and Supplies | 425120 | Wholesale Trade Agents and Brokers |
| 5092 | Toys and Hobby Goods and Supplies | 459120 | Hobby, Toy, and Game Retailers |
| 5093 | Scrap and Waste Materials | 423930 | Recyclable Material Merchant Wholesalers |
| 5093 | Scrap and Waste Materials | 425120 | Wholesale Trade Agents and Brokers |
| 5093 | Scrap and Waste Materials | 425120 | Wholesale Trade Agents and Brokers |
| 5094 | Jewelry and Precious Stones | 423940 | Jewelry, Watch, Precious Stone, and Precious Metal Merchant Wholesalers |
| 5094 | Jewelry and Precious Stones | 425120 | Wholesale Trade Agents and Brokers |

| SIC | SIC Title | 2022 NAICS | 2022 NAICS Title |
|------------|---------------------------------------|-------------------|--|
| 5094 | Jewelry and Precious Stones | 425120 | Wholesale Trade Agents and Brokers |
| 5094 | Jewelry and Precious Stones | 458310 | Jewelry Retailers |
| 5099 | Durable Goods, Nec | 423990 | Other Miscellaneous Durable Goods Merchant Wholesalers |
| 5099 | Durable Goods, Nec | 425120 | Wholesale Trade Agents and Brokers |
| 5099 | Durable Goods, Nec | 425120 | Wholesale Trade Agents and Brokers |
| 5099 | Durable Goods, Nec | 444180 | Other Building Material Dealers |
| 5099 | Durable Goods, Nec | 449210 | Electronics and Appliance Retailers |
| 5099 | Durable Goods, Nec | 459110 | Sporting Goods Retailers |
| 5099 | Durable Goods, Nec | 459120 | Hobby, Toy, and Game Retailers |
| 5111 | Printing and Writing Paper | 424110 | Printing and Writing Paper Merchant Wholesalers |
| 5111 | Printing and Writing Paper | 425120 | Wholesale Trade Agents and Brokers |
| 5111 | Printing and Writing Paper | 425120 | Wholesale Trade Agents and Brokers |
| 5111 | Printing and Writing Paper | 459410 | Office Supplies and Stationery Retailers |
| 5112 | Stationery and Office Supplies | 424120 | Stationery and Office Supplies Merchant Wholesalers |
| 5112 | Stationery and Office Supplies | 425120 | Wholesale Trade Agents and Brokers |
| 5112 | Stationery and Office Supplies | 425120 | Wholesale Trade Agents and Brokers |
| 5112 | Stationery and Office Supplies | 459410 | Office Supplies and Stationery Retailers |
| 5113 | Industrial and Personal Service Paper | 424130 | Industrial and Personal Service Paper Merchant Wholesalers |
| 5113 | Industrial and Personal Service Paper | 425120 | Wholesale Trade Agents and Brokers |
| 5113 | Industrial and Personal Service Paper | 425120 | Wholesale Trade Agents and Brokers |

| SIC | SIC Title | 2022 NAICS | 2022 NAICS Title |
|------------|---------------------------------------|-------------------|---|
| 5113 | Industrial and Personal Service Paper | 459999 | All Other Miscellaneous Retailers |
| 5122 | Drugs, Proprietaries, and Sundries | 424210 | Drugs and Druggists' Sundries Merchant Wholesalers |
| 5122 | Drugs, Proprietaries, and Sundries | 425120 | Wholesale Trade Agents and Brokers |
| 5122 | Drugs, Proprietaries, and Sundries | 425120 | Wholesale Trade Agents and Brokers |
| 5122 | Drugs, Proprietaries, and Sundries | 456110 | Pharmacies and Drug Retailers |
| 5122 | Drugs, Proprietaries, and Sundries | 456120 | Cosmetics, Beauty Supplies, and Perfume Retailers |
| 5122 | Drugs, Proprietaries, and Sundries | 456191 | Food (Health) Supplement Retailers |
| 5131 | Piece Goods and Notions | 313310 | Textile and Fabric Finishing Mills |
| 5131 | Piece Goods and Notions | 313310 | Textile and Fabric Finishing Mills |
| 5131 | Piece Goods and Notions | 424310 | Piece Goods, Notions, and Other Dry Goods Merchant Wholesalers |
| 5131 | Piece Goods and Notions | 425120 | Wholesale Trade Agents and Brokers |
| 5131 | Piece Goods and Notions | 425120 | Wholesale Trade Agents and Brokers |
| 5131 | Piece Goods and Notions | 459130 | Sewing, Needlework, and Piece Goods Retailers |
| 5136 | Men's and Boy's Clothing | 423910 | Sporting and Recreational Goods and Supplies Merchant Wholesalers |
| 5136 | Men's and Boy's Clothing | 424350 | Clothing and Clothing Accessories Merchant Wholesalers |
| 5136 | Men's and Boy's Clothing | 425120 | Wholesale Trade Agents and Brokers |
| 5136 | Men's and Boy's Clothing | 425120 | Wholesale Trade Agents and Brokers |
| 5136 | Men's and Boy's Clothing | 458110 | Clothing and Clothing Accessories Retailers |
| 5136 | Men's and Boy's Clothing | 458110 | Clothing and Clothing Accessories Retailers |
| 5137 | Women's and Children's Clothing | 423910 | Sporting and Recreational Goods and Supplies Merchant Wholesalers |

| SIC | SIC Title | 2022 NAICS | 2022 NAICS Title |
|------------|--|-------------------|---|
| 5137 | Women's and Children's Clothing | 424350 | Clothing and Clothing Accessories Merchant Wholesalers |
| 5137 | Women's and Children's Clothing | 425120 | Wholesale Trade Agents and Brokers |
| 5137 | Women's and Children's Clothing | 425120 | Wholesale Trade Agents and Brokers |
| 5137 | Women's and Children's Clothing | 458110 | Clothing and Clothing Accessories Retailers |
| 5137 | Women's and Children's Clothing | 458110 | Clothing and Clothing Accessories Retailers |
| 5137 | Women's and Children's Clothing | 458110 | Clothing and Clothing Accessories Retailers |
| 5139 | Footwear | 424340 | Footwear Merchant Wholesalers |
| 5139 | Footwear | 425120 | Wholesale Trade Agents and Brokers |
| 5139 | Footwear | 425120 | Wholesale Trade Agents and Brokers |
| 5139 | Footwear | 458210 | Shoe Retailers |
| 5141 | Groceries, General Line | 424410 | General Line Grocery Merchant Wholesalers |
| 5141 | Groceries, General Line | 425120 | Wholesale Trade Agents and Brokers |
| 5141 | Groceries, General Line | 425120 | Wholesale Trade Agents and Brokers |
| 5141 | Groceries, General Line | 445110 | Supermarkets and Other Grocery Retailers (except Convenience Retailers) |
| 5142 | Packaged Frozen Goods | 424420 | Packaged Frozen Food Merchant Wholesalers |
| 5142 | Packaged Frozen Goods | 425120 | Wholesale Trade Agents and Brokers |
| 5142 | Packaged Frozen Goods | 425120 | Wholesale Trade Agents and Brokers |
| 5143 | Dairy Products, Except Dried or Canned | 424430 | Dairy Product (except Dried or Canned) Merchant Wholesalers |
| 5143 | Dairy Products, Except Dried or Canned | 425120 | Wholesale Trade Agents and Brokers |
| 5143 | Dairy Products, Except Dried or Canned | 425120 | Wholesale Trade Agents and Brokers |
| 5143 | Dairy Products, Except Dried or Canned | 445298 | All Other Specialty Food Retailers |

| SIC | SIC Title | 2022 NAICS | 2022 NAICS Title |
|------------|-------------------------------------|-------------------|--|
| 5144 | Poultry and Poultry Products | 424440 | Poultry and Poultry Product Merchant Wholesalers |
| 5144 | Poultry and Poultry Products | 425120 | Wholesale Trade Agents and Brokers |
| 5144 | Poultry and Poultry Products | 425120 | Wholesale Trade Agents and Brokers |
| 5144 | Poultry and Poultry Products | 445240 | Meat Retailers |
| 5145 | Confectionery | 424450 | Confectionery Merchant Wholesalers |
| 5145 | Confectionery | 425120 | Wholesale Trade Agents and Brokers |
| 5145 | Confectionery | 425120 | Wholesale Trade Agents and Brokers |
| 5145 | Confectionery | 445292 | Confectionery and Nut Retailers |
| 5146 | Fish and Seafoods | 424460 | Fish and Seafood Merchant Wholesalers |
| 5146 | Fish and Seafoods | 425120 | Wholesale Trade Agents and Brokers |
| 5146 | Fish and Seafoods | 425120 | Wholesale Trade Agents and Brokers |
| 5146 | Fish and Seafoods | 445250 | Fish and Seafood Retailers |
| 5147 | Meats and Meat Products | 311612 | Meat Processed from Carcasses |
| 5147 | Meats and Meat Products | 424470 | Meat and Meat Product Merchant Wholesalers |
| 5147 | Meats and Meat Products | 425120 | Wholesale Trade Agents and Brokers |
| 5147 | Meats and Meat Products | 425120 | Wholesale Trade Agents and Brokers |
| 5147 | Meats and Meat Products | 445240 | Meat Retailers |
| 5148 | Fresh Fruits and Vegetables | 424480 | Fresh Fruit and Vegetable Merchant Wholesalers |
| 5148 | Fresh Fruits and Vegetables | 425120 | Wholesale Trade Agents and Brokers |
| 5148 | Fresh Fruits and Vegetables | 425120 | Wholesale Trade Agents and Brokers |
| 5148 | Fresh Fruits and Vegetables | 445230 | Fruit and Vegetable Retailers |
| 5149 | Groceries and Related Products, Nec | 312112 | Bottled Water Manufacturing |

| SIC | SIC Title | 2022 NAICS | 2022 NAICS Title |
|------------|-------------------------------------|-------------------|--|
| 5149 | Groceries and Related Products, Nec | 424490 | Other Grocery and Related Products Merchant Wholesalers |
| 5149 | Groceries and Related Products, Nec | 425120 | Wholesale Trade Agents and Brokers |
| 5149 | Groceries and Related Products, Nec | 425120 | Wholesale Trade Agents and Brokers |
| 5149 | Groceries and Related Products, Nec | 445298 | All Other Specialty Food Retailers |
| 5149 | Groceries and Related Products, Nec | 459910 | Pet and Pet Supplies Retailers |
| 5153 | Grain and Field Beans | 424510 | Grain and Field Bean Merchant Wholesalers |
| 5153 | Grain and Field Beans | 425120 | Wholesale Trade Agents and Brokers |
| 5153 | Grain and Field Beans | 425120 | Wholesale Trade Agents and Brokers |
| 5153 | Grain and Field Beans | 444240 | Nursery, Garden Center, and Farm Supply Retailers |
| 5154 | Livestock | 424520 | Livestock Merchant Wholesalers |
| 5154 | Livestock | 425120 | Wholesale Trade Agents and Brokers |
| 5154 | Livestock | 425120 | Wholesale Trade Agents and Brokers |
| 5159 | Farm-product Raw Materials, Nec | 424590 | Other Farm Product Raw Material Merchant Wholesalers |
| 5159 | Farm-product Raw Materials, Nec | 425120 | Wholesale Trade Agents and Brokers |
| 5159 | Farm-product Raw Materials, Nec | 425120 | Wholesale Trade Agents and Brokers |
| 5159 | Farm-product Raw Materials, Nec | 444240 | Nursery, Garden Center, and Farm Supply Retailers |
| 5162 | Plastics Materials and Basic Shapes | 424610 | Plastics Materials and Basic Forms and Shapes Merchant Wholesalers |
| 5162 | Plastics Materials and Basic Shapes | 425120 | Wholesale Trade Agents and Brokers |

| SIC | SIC Title | 2022 NAICS | 2022 NAICS Title |
|------------|---------------------------------------|-------------------|--|
| 5162 | Plastics Materials and Basic Shapes | 425120 | Wholesale Trade Agents and Brokers |
| 5162 | Plastics Materials and Basic Shapes | 459999 | All Other Miscellaneous Retailers |
| 5169 | Chemicals and Allied Products, Nec | 424690 | Other Chemical and Allied Products Merchant Wholesalers |
| 5169 | Chemicals and Allied Products, Nec | 425120 | Wholesale Trade Agents and Brokers |
| 5169 | Chemicals and Allied Products, Nec | 425120 | Wholesale Trade Agents and Brokers |
| 5171 | Petroleum Bulk Stations and Terminals | 424710 | Petroleum Bulk Stations and Terminals |
| 5171 | Petroleum Bulk Stations and Terminals | 457210 | Fuel Dealers |
| 5171 | Petroleum Bulk Stations and Terminals | 457210 | Fuel Dealers |
| 5172 | Petroleum Products, Nec | 424720 | Petroleum and Petroleum Products Merchant Wholesalers (except Bulk Stations and Terminals) |
| 5172 | Petroleum Products, Nec | 425120 | Wholesale Trade Agents and Brokers |
| 5172 | Petroleum Products, Nec | 425120 | Wholesale Trade Agents and Brokers |
| 5181 | Beer and Ale | 424810 | Beer and Ale Merchant Wholesalers |
| 5181 | Beer and Ale | 425120 | Wholesale Trade Agents and Brokers |
| 5181 | Beer and Ale | 425120 | Wholesale Trade Agents and Brokers |
| 5181 | Beer and Ale | 445320 | Beer, Wine, and Liquor Retailers |
| 5182 | Wine and Distilled Beverages | 424820 | Wine and Distilled Alcoholic Beverage Merchant Wholesalers |
| 5182 | Wine and Distilled Beverages | 425120 | Wholesale Trade Agents and Brokers |
| 5182 | Wine and Distilled Beverages | 425120 | Wholesale Trade Agents and Brokers |

| SIC | SIC Title | 2022 NAICS | 2022 NAICS Title |
|------------|------------------------------------|-------------------|---|
| 5182 | Wine and Distilled Beverages | 445320 | Beer, Wine, and Liquor Retailers |
| 5191 | Farm Supplies | 424910 | Farm Supplies Merchant Wholesalers |
| 5191 | Farm Supplies | 425120 | Wholesale Trade Agents and Brokers |
| 5191 | Farm Supplies | 425120 | Wholesale Trade Agents and Brokers |
| 5191 | Farm Supplies | 444240 | Nursery, Garden Center, and Farm Supply Retailers |
| 5192 | Books, Periodicals, and Newspapers | 424920 | Book, Periodical, and Newspaper Merchant Wholesalers |
| 5192 | Books, Periodicals, and Newspapers | 425120 | Wholesale Trade Agents and Brokers |
| 5192 | Books, Periodicals, and Newspapers | 425120 | Wholesale Trade Agents and Brokers |
| 5192 | Books, Periodicals, and Newspapers | 459210 | Book Retailers and News Dealers |
| 5193 | Flowers and Florists Supplies | 424930 | Flower, Nursery Stock, and Florists' Supplies Merchant Wholesalers |
| 5193 | Flowers and Florists Supplies | 425120 | Wholesale Trade Agents and Brokers |
| 5193 | Flowers and Florists Supplies | 425120 | Wholesale Trade Agents and Brokers |
| 5193 | Flowers and Florists Supplies | 444240 | Nursery, Garden Center, and Farm Supply Retailers |
| 5194 | Tobacco and Tobacco Products | 424940 | Tobacco Product and Electronic Cigarette Merchant Wholesalers |
| 5194 | Tobacco and Tobacco Products | 425120 | Wholesale Trade Agents and Brokers |
| 5194 | Tobacco and Tobacco Products | 425120 | Wholesale Trade Agents and Brokers |
| 5194 | Tobacco and Tobacco Products | 459991 | Tobacco, Electronic Cigarette, and Other Smoking Supplies Retailers |
| 5198 | Paints, Varnishes, and Supplies | 424950 | Paint, Varnish, and Supplies Merchant Wholesalers |
| 5198 | Paints, Varnishes, and Supplies | 425120 | Wholesale Trade Agents and Brokers |

| SIC | SIC Title | 2022 NAICS | 2022 NAICS Title |
|------------|--|-------------------|---|
| 5198 | Paints, Varnishes, and Supplies | 425120 | Wholesale Trade Agents and Brokers |
| 5199 | Nondurable Goods, Nec | 424310 | Piece Goods, Notions, and Other Dry Goods Merchant Wholesalers |
| 5199 | Nondurable Goods, Nec | 424340 | Footwear Merchant Wholesalers |
| 5199 | Nondurable Goods, Nec | 424610 | Plastics Materials and Basic Forms and Shapes Merchant Wholesalers |
| 5199 | Nondurable Goods, Nec | 424990 | Other Miscellaneous Nondurable Goods Merchant Wholesalers |
| 5199 | Nondurable Goods, Nec | 425120 | Wholesale Trade Agents and Brokers |
| 5199 | Nondurable Goods, Nec | 425120 | Wholesale Trade Agents and Brokers |
| 5199 | Nondurable Goods, Nec | 459420 | Gift, Novelty, and Souvenir Retailers |
| 5199 | Nondurable Goods, Nec | 459910 | Pet and Pet Supplies Retailers |
| 5199 | Nondurable Goods, Nec | 459991 | Tobacco, Electronic Cigarette, and Other Smoking Supplies Retailers |
| 5199 | Nondurable Goods, Nec | 541890 | Other Services Related to Advertising |
| 7211 | Power Laundries, Family and Commercial | 812320 | Drycleaning and Laundry Services (except Coin-Operated) |
| 7212 | Garment Pressing and Cleaners' Agents | 812320 | Drycleaning and Laundry Services (except Coin-Operated) |
| 7213 | Linen Supply | 812331 | Linen Supply |
| 7215 | Coin-operated Laundries and Cleaning | 812310 | Coin-Operated Laundries and Drycleaners |
| 7216 | Drycleaning Plants, Except Rugs | 812320 | Drycleaning and Laundry Services (except Coin-Operated) |
| 7217 | Carpet and Upholstery Cleaning | 561740 | Carpet and Upholstery Cleaning Services |
| 7218 | Industrial Launderers | 812332 | Industrial Launderers |
| 7219 | Laundry and Garment Services, Nec | 811490 | Other Personal and Household Goods Repair and Maintenance |

| SIC | SIC Title | 2022 NAICS | 2022 NAICS Title |
|------------|-----------------------------------|-------------------|--|
| 7219 | Laundry and Garment Services, Nec | 812320 | Drycleaning and Laundry Services (except Coin-Operated) |
| 7219 | Laundry and Garment Services, Nec | 812331 | Linen Supply |
| 7221 | Photographic Studios, Portrait | 541921 | Photography Studios, Portrait |
| 7231 | Beauty Shops | 611511 | Cosmetology and Barber Schools |
| 7231 | Beauty Shops | 812112 | Beauty Salons |
| 7231 | Beauty Shops | 812113 | Nail Salons |
| 7241 | Barber Shops | 611511 | Cosmetology and Barber Schools |
| 7241 | Barber Shops | 812111 | Barber Shops |
| 7251 | Shoe Repair and Shoeshine Parlors | 811430 | Footwear and Leather Goods Repair |
| 7251 | Shoe Repair and Shoeshine Parlors | 812320 | Drycleaning and Laundry Services (except Coin-Operated) |
| 7251 | Shoe Repair and Shoeshine Parlors | 812990 | All Other Personal Services |
| 7261 | Funeral Service and Crematories | 812210 | Funeral Homes and Funeral Services |
| 7261 | Funeral Service and Crematories | 812220 | Cemeteries and Crematories |
| 7291 | Tax Return Preparation Services | 541213 | Tax Preparation Services |
| 7299 | Miscellaneous Personal Services | 532281 | Formal Wear and Costume Rental |
| 7299 | Miscellaneous Personal Services | 541990 | All Other Professional, Scientific, and Technical Services |
| 7299 | Miscellaneous Personal Services | 561311 | Employment Placement Agencies |
| 7299 | Miscellaneous Personal Services | 561990 | All Other Support Services |
| 7299 | Miscellaneous Personal Services | 812191 | Diet and Weight Reducing Centers |
| 7299 | Miscellaneous Personal Services | 812199 | Other Personal Care Services |
| 7299 | Miscellaneous Personal Services | 812930 | Parking Lots and Garages |

| SIC | SIC Title | 2022 NAICS | 2022 NAICS Title |
|------------|--|-------------------|---|
| 7299 | Miscellaneous Personal Services | 812990 | All Other Personal Services |
| 7311 | Advertising Agencies | 541810 | Advertising Agencies |
| 7312 | Outdoor Advertising Services | 541850 | Indoor and Outdoor Display Advertising |
| 7313 | Radio, Television, Publisher Representatives | 541840 | Media Representatives |
| 7319 | Advertising, Nec | 481219 | Other Nonscheduled Air Transportation |
| 7319 | Advertising, Nec | 541830 | Media Buying Agencies |
| 7319 | Advertising, Nec | 541850 | Indoor and Outdoor Display Advertising |
| 7319 | Advertising, Nec | 541870 | Advertising Material Distribution Services |
| 7319 | Advertising, Nec | 541890 | Other Services Related to Advertising |
| 7322 | Adjustment and Collection Services | 561440 | Collection Agencies |
| 7323 | Credit Reporting Services | 561450 | Credit Bureaus |
| 7331 | Direct Mail Advertising Services | 513140 | Directory and Mailing List Publishers |
| 7331 | Direct Mail Advertising Services | 541860 | Direct Mail Advertising |
| 7334 | Photocopying and Duplicating Services | 323111 | Commercial Printing (except Screen and Books) |
| 7334 | Photocopying and Duplicating Services | 561439 | Other Business Service Centers (including Copy Shops) |
| 7335 | Commercial Photography | 481219 | Other Nonscheduled Air Transportation |
| 7335 | Commercial Photography | 541922 | Commercial Photography |
| 7336 | Commercial Art and Graphic Design | 541430 | Graphic Design Services |
| 7338 | Secretarial and Court Reporting | 561410 | Document Preparation Services |
| 7338 | Secretarial and Court Reporting | 561492 | Court Reporting and Stenotype Services |
| 7342 | Disinfecting and Pest Control Services | 561710 | Exterminating and Pest Control Services |

| SIC | SIC Title | 2022 NAICS | 2022 NAICS Title |
|------------|--|-------------------|---|
| 7342 | Disinfecting and Pest Control Services | 561720 | Janitorial Services |
| 7349 | Building Maintenance Services, Nec | 561720 | Janitorial Services |
| 7349 | Building Maintenance Services, Nec | 561790 | Other Services to Buildings and Dwellings |
| 7352 | Medical Equipment Rental | 532283 | Home Health Equipment Rental |
| 7352 | Medical Equipment Rental | 532490 | Other Commercial and Industrial Machinery and Equipment Rental and Leasing |
| 7353 | Heavy Construction Equipment Rental | 238910 | Site Preparation Contractors |
| 7353 | Heavy Construction Equipment Rental | 238990 | All Other Specialty Trade Contractors |
| 7353 | Heavy Construction Equipment Rental | 532412 | Construction, Mining, and Forestry Machinery and Equipment Rental and Leasing |
| 7359 | Equipment Rental and Leasing, Nec | 532210 | Consumer Electronics and Appliances Rental |
| 7359 | Equipment Rental and Leasing, Nec | 532289 | All Other Consumer Goods Rental |
| 7359 | Equipment Rental and Leasing, Nec | 532310 | General Rental Centers |
| 7359 | Equipment Rental and Leasing, Nec | 532411 | Commercial Air, Rail, and Water Transportation Equipment Rental and Leasing |
| 7359 | Equipment Rental and Leasing, Nec | 532412 | Construction, Mining, and Forestry Machinery and Equipment Rental and Leasing |
| 7359 | Equipment Rental and Leasing, Nec | 532420 | Office Machinery and Equipment Rental and Leasing |
| 7359 | Equipment Rental and Leasing, Nec | 532490 | Other Commercial and Industrial Machinery and Equipment Rental and Leasing |
| 7359 | Equipment Rental and Leasing, Nec | 562991 | Septic Tank and Related Services |

| SIC | SIC Title | 2022 NAICS | 2022 NAICS Title |
|------------|--------------------------------------|-------------------|--|
| 7361 | Employment Agencies | 541612 | Human Resources Consulting Services |
| 7361 | Employment Agencies | 561311 | Employment Placement Agencies |
| 7361 | Employment Agencies | 561312 | Executive Search Services |
| 7363 | Help Supply Services | 561320 | Temporary Help Services |
| 7363 | Help Supply Services | 561330 | Professional Employer Organizations |
| 7371 | Custom Computer Programming Services | 541511 | Custom Computer Programming Services |
| 7372 | Prepackaged Software | 334610 | Manufacturing and Reproducing Magnetic and Optical Media |
| 7372 | Prepackaged Software | 513210 | Software Publishers |
| 7373 | Computer Integrated Systems Design | 541512 | Computer Systems Design Services |
| 7374 | Data Processing and Preparation | 518210 | Computing Infrastructure Providers, Data Processing, Web Hosting, and Related Services |
| 7375 | Information Retrieval Services | 517111 | Wired Telecommunications Carriers |
| 7375 | Information Retrieval Services | 517122 | Agents for Wireless Telecommunications Services |
| 7375 | Information Retrieval Services | 517810 | All Other Telecommunications |
| 7376 | Computer Facilities Management | 541513 | Computer Facilities Management Services |
| 7377 | Computer Rental and Leasing | 532420 | Office Machinery and Equipment Rental and Leasing |
| 7378 | Computer Maintenance and Repair | 449210 | Electronics and Appliance Retailers |
| 7378 | Computer Maintenance and Repair | 811210 | Electronic and Precision Equipment Repair and Maintenance |
| 7379 | Computer Related Services, Nec | 518210 | Computing Infrastructure Providers, Data Processing, Web Hosting, and Related Services |

| SIC | SIC Title | 2022 NAICS | 2022 NAICS Title |
|------------|------------------------------------|-------------------|--|
| 7379 | Computer Related Services, Nec | 541512 | Computer Systems Design Services |
| 7379 | Computer Related Services, Nec | 541519 | Other Computer Related Services |
| 7381 | Detective and Armored Car Services | 561611 | Investigation and Personal Background Check Services |
| 7381 | Detective and Armored Car Services | 561612 | Security Guards and Patrol Services |
| 7381 | Detective and Armored Car Services | 561613 | Armored Car Services |
| 7382 | Security Systems Services | 561621 | Security Systems Services (except Locksmiths) |
| 7383 | News Syndicates | 516210 | Media Streaming Distribution Services, Social Networks, and Other Media Networks and Content Providers |
| 7383 | News Syndicates | 711510 | Independent Artists, Writers, and Performers |
| 7384 | Photofinish Laboratories | 812921 | Photofinishing Laboratories (except One-Hour) |
| 7384 | Photofinish Laboratories | 812922 | One-Hour Photofinishing |
| 7389 | Business Services, Nec | 312230 | Tobacco Manufacturing |
| 7389 | Business Services, Nec | 313310 | Textile and Fabric Finishing Mills |
| 7389 | Business Services, Nec | 314999 | All Other Miscellaneous Textile Product Mills |
| 7389 | Business Services, Nec | 325998 | All Other Miscellaneous Chemical Product and Preparation Manufacturing |
| 7389 | Business Services, Nec | 425120 | Wholesale Trade Agents and Brokers |
| 7389 | Business Services, Nec | 488490 | Other Support Activities for Road Transportation |
| 7389 | Business Services, Nec | 491110 | Postal Service |
| 7389 | Business Services, Nec | 512240 | Sound Recording Studios |
| 7389 | Business Services, Nec | 512290 | Other Sound Recording Industries |

| SIC | SIC Title | 2022 NAICS | 2022 NAICS Title |
|------------|------------------------|-------------------|--|
| 7389 | Business Services, Nec | 518210 | Computing Infrastructure Providers, Data Processing, Web Hosting, and Related Services |
| 7389 | Business Services, Nec | 519290 | Web Search Portals and All Other Information Services |
| 7389 | Business Services, Nec | 522320 | Financial Transactions Processing, Reserve, and Clearinghouse Activities |
| 7389 | Business Services, Nec | 541199 | All Other Legal Services |
| 7389 | Business Services, Nec | 541340 | Drafting Services |
| 7389 | Business Services, Nec | 541350 | Building Inspection Services |
| 7389 | Business Services, Nec | 541370 | Surveying and Mapping (except Geophysical) Services |
| 7389 | Business Services, Nec | 541410 | Interior Design Services |
| 7389 | Business Services, Nec | 541420 | Industrial Design Services |
| 7389 | Business Services, Nec | 541490 | Other Specialized Design Services |
| 7389 | Business Services, Nec | 541870 | Advertising Material Distribution Services |
| 7389 | Business Services, Nec | 541890 | Other Services Related to Advertising |
| 7389 | Business Services, Nec | 541930 | Translation and Interpretation Services |
| 7389 | Business Services, Nec | 541990 | All Other Professional, Scientific, and Technical Services |
| 7389 | Business Services, Nec | 561410 | Document Preparation Services |
| 7389 | Business Services, Nec | 561421 | Telephone Answering Services |
| 7389 | Business Services, Nec | 561422 | Telemarketing Bureaus and Other Contact Centers |
| 7389 | Business Services, Nec | 561431 | Private Mail Centers |
| 7389 | Business Services, Nec | 561439 | Other Business Service Centers (including Copy Shops) |
| 7389 | Business Services, Nec | 561440 | Collection Agencies |

| SIC | SIC Title | 2022 NAICS | 2022 NAICS Title |
|------------|---|-------------------|---|
| 7389 | Business Services, Nec | 561491 | Repossession Services |
| 7389 | Business Services, Nec | 561499 | All Other Business Support Services |
| 7389 | Business Services, Nec | 561591 | Convention and Visitors Bureaus |
| 7389 | Business Services, Nec | 561599 | All Other Travel Arrangement and Reservation Services |
| 7389 | Business Services, Nec | 561790 | Other Services to Buildings and Dwellings |
| 7389 | Business Services, Nec | 561910 | Packaging and Labeling Services |
| 7389 | Business Services, Nec | 561920 | Convention and Trade Show Organizers |
| 7389 | Business Services, Nec | 561990 | All Other Support Services |
| 7389 | Business Services, Nec | 711310 | Promoters of Performing Arts, Sports, and Similar Events with Facilities |
| 7389 | Business Services, Nec | 711320 | Promoters of Performing Arts, Sports, and Similar Events without Facilities |
| 7389 | Business Services, Nec | 711410 | Agents and Managers for Artists, Athletes, Entertainers, and Other Public Figures |
| 7389 | Business Services, Nec | 812320 | Drycleaning and Laundry Services (except Coin-Operated) |
| 7389 | Business Services, Nec | 812990 | All Other Personal Services |
| 7513 | Truck Rental and Leasing, Without Drivers | 532120 | Truck, Utility Trailer, and RV (Recreational Vehicle) Rental and Leasing |
| 7514 | Passenger Car Rental | 532111 | Passenger Car Rental |
| 7515 | Passenger Car Leasing | 532112 | Passenger Car Leasing |
| 7519 | Utility Trailer Rental | 532120 | Truck, Utility Trailer, and RV (Recreational Vehicle) Rental and Leasing |
| 7521 | Automobile Parking | 812930 | Parking Lots and Garages |
| 7532 | Top and Body Repair and Paint Shops | 811121 | Automotive Body, Paint, and Interior Repair and Maintenance |

| SIC | SIC Title | 2022 NAICS | 2022 NAICS Title |
|------------|--------------------------------------|-------------------|---|
| 7533 | Auto Exhaust System Repair Shops | 811114 | Specialized Automotive Repair |
| 7534 | Tire Retreading and Repair Shops | 326212 | Tire Retreading |
| 7534 | Tire Retreading and Repair Shops | 811198 | All Other Automotive Repair and Maintenance |
| 7536 | Automotive Glass Replacement Shops | 811122 | Automotive Glass Replacement Shops |
| 7537 | Automotive Transmission Repair Shops | 811114 | Specialized Automotive Repair |
| 7538 | General Automotive Repair Shops | 811111 | General Automotive Repair |
| 7539 | Automotive Repair Shops, Nec | 811114 | Specialized Automotive Repair |
| 7539 | Automotive Repair Shops, Nec | 811198 | All Other Automotive Repair and Maintenance |
| 7542 | Carwashes | 811192 | Car Washes |
| 7549 | Automotive Services, Nec | 488410 | Motor Vehicle Towing |
| 7549 | Automotive Services, Nec | 811122 | Automotive Glass Replacement Shops |
| 7549 | Automotive Services, Nec | 811191 | Automotive Oil Change and Lubrication Shops |
| 7549 | Automotive Services, Nec | 811198 | All Other Automotive Repair and Maintenance |
| 7622 | Radio and Television Repair | 238290 | Other Building Equipment Contractors |
| 7622 | Radio and Television Repair | 449210 | Electronics and Appliance Retailers |
| 7622 | Radio and Television Repair | 811210 | Electronic and Precision Equipment Repair and Maintenance |
| 7622 | Radio and Television Repair | 811210 | Electronic and Precision Equipment Repair and Maintenance |
| 7623 | Refrigeration Service and Repair | 449210 | Electronics and Appliance Retailers |
| 7623 | Refrigeration Service and Repair | 811310 | Commercial and Industrial Machinery and Equipment (except Automotive and Electronic) Repair and Maintenance |
| 7623 | Refrigeration Service and Repair | 811412 | Appliance Repair and Maintenance |

| SIC | SIC Title | 2022 NAICS | 2022 NAICS Title |
|------------|-----------------------------------|-------------------|---|
| 7629 | Electrical Repair Shops | 449210 | Electronics and Appliance Retailers |
| 7629 | Electrical Repair Shops | 811210 | Electronic and Precision Equipment Repair and Maintenance |
| 7629 | Electrical Repair Shops | 811210 | Electronic and Precision Equipment Repair and Maintenance |
| 7629 | Electrical Repair Shops | 811210 | Electronic and Precision Equipment Repair and Maintenance |
| 7629 | Electrical Repair Shops | 811210 | Electronic and Precision Equipment Repair and Maintenance |
| 7629 | Electrical Repair Shops | 811412 | Appliance Repair and Maintenance |
| 7631 | Watch, Clock, and Jewelry Repair | 458310 | Jewelry Retailers |
| 7631 | Watch, Clock, and Jewelry Repair | 811490 | Other Personal and Household Goods Repair and Maintenance |
| 7641 | Reupholstery and Furniture Repair | 811420 | Reupholstery and Furniture Repair |
| 7692 | Welding Repair | 811310 | Commercial and Industrial Machinery and Equipment (except Automotive and Electronic) Repair and Maintenance |
| 7694 | Armature Rewinding Shops | 335312 | Motor and Generator Manufacturing |
| 7694 | Armature Rewinding Shops | 811310 | Commercial and Industrial Machinery and Equipment (except Automotive and Electronic) Repair and Maintenance |
| 7699 | Repair Services, Nec | 115210 | Support Activities for Animal Production |
| 7699 | Repair Services, Nec | 238220 | Plumbing, Heating, and Air-Conditioning Contractors |
| 7699 | Repair Services, Nec | 444140 | Hardware Retailers |
| 7699 | Repair Services, Nec | 444230 | Outdoor Power Equipment Retailers |
| 7699 | Repair Services, Nec | 449129 | All Other Home Furnishings Retailers |
| 7699 | Repair Services, Nec | 459110 | Sporting Goods Retailers |

| SIC | SIC Title | 2022 NAICS | 2022 NAICS Title |
|------------|----------------------|-------------------|---|
| 7699 | Repair Services, Nec | 488390 | Other Support Activities for Water Transportation |
| 7699 | Repair Services, Nec | 561622 | Locksmiths |
| 7699 | Repair Services, Nec | 561790 | Other Services to Buildings and Dwellings |
| 7699 | Repair Services, Nec | 562991 | Septic Tank and Related Services |
| 7699 | Repair Services, Nec | 562998 | All Other Miscellaneous Waste Management Services |
| 7699 | Repair Services, Nec | 711510 | Independent Artists, Writers, and Performers |
| 7699 | Repair Services, Nec | 811210 | Electronic and Precision Equipment Repair and Maintenance |
| 7699 | Repair Services, Nec | 811210 | Electronic and Precision Equipment Repair and Maintenance |
| 7699 | Repair Services, Nec | 811210 | Electronic and Precision Equipment Repair and Maintenance |
| 7699 | Repair Services, Nec | 811310 | Commercial and Industrial Machinery and Equipment (except Automotive and Electronic) Repair and Maintenance |
| 7699 | Repair Services, Nec | 811411 | Home and Garden Equipment Repair and Maintenance |
| 7699 | Repair Services, Nec | 811412 | Appliance Repair and Maintenance |
| 7699 | Repair Services, Nec | 811430 | Footwear and Leather Goods Repair |
| 7699 | Repair Services, Nec | 811490 | Other Personal and Household Goods Repair and Maintenance |

Appendix B: Guidance for TURA Reporting and Planning for Certain Categories and Chemicals

Rules for Reporting Water Dissociable Nitrate Compounds Category

The 2000 EPA TRI guidance document, "List of Toxic Chemicals within the Water Dissociable Nitrate Compounds Category and Guidance for Reporting" (EPA 745-R-00-006), provides a detailed description of how to report this chemical category on Form R. Additional information on reporting nitrate compounds for the neutralization of nitric acid can be found in the fact sheet "Reporting Water Dissociable Nitrates" produced by the Office of Technical Assistance (<https://www.mass.gov/media/1314831>). The following general overview is from the EPA guidance document:

"Chemicals within the nitrate compounds category are only reportable when in aqueous solution. All water dissociable nitrate compounds are included in the nitrate compounds category, including ammonium nitrate. Specifically listed section 313 chemicals *are not* included in threshold determinations for chemical categories such as the water dissociable nitrate compounds category. Specifically listed toxic chemicals are subject to their own individual threshold determinations. As of December 1, 1994, ammonium nitrate (solution) is not an individually listed chemical on the EPCRA section 313 list. However, ammonium nitrate is still subject to reporting under the nitrate compounds category. In addition, the aqueous ammonia from the dissociation of ammonium nitrate when in aqueous solution is subject to reporting under the ammonia listing."

Determining Threshold Quantities for Nitrate Compounds

The total nitrate compound, including **both** the nitrate ion portion and the counterion, is included

in the nitrate compounds category. When determining threshold amounts, the **total** weight of the nitrate compound is to be included in all calculations.

If a facility treats wastewater on-site biologically, using the activated sludge process, for example, the facility may be generating nitrate compounds as a result of this biological process. The nitrate ion generated from this process will be associated with various counterions (e.g. sodium ion,

potassium ion). In the absence of information on the identity of the counterion, a facility should assume for the purposes of TURA threshold determinations that the counterion is sodium ion.

Determining Byproduct Quantities for Nitrate Compounds

Only the nitrate ion (NO₃) portion of nitrate compounds is to be included when determining the amount of the chemicals within the nitrate compounds category that are generated as byproduct. Since some of the nitrate compounds generated by a process may also be destroyed in that process (e.g., biological wastewater treatment), the quantity of byproduct is equivalent to the sum of Part II, Sections 8.1 through 8.8 **minus** Section 8.6 (quantity treated onsite) of the EPA Form R.

Example

- Threshold determination -

In a calendar year, a facility coincidentally manufactures 20,000 pounds of sodium nitrate and 10,000 pounds of calcium nitrate, both in aqueous solutions, and releases these solutions to wastewater streams. The total quantity of nitrate compounds manufactured by the facility is the sum of the two chemicals, or 30,000 pounds, which exceeds the manufacturing threshold quantity of 25,000 pounds. The facility, therefore, is required to report 30,000 pounds for the nitrate compounds category.

- Byproduct determination -

By weight, the nitrate ion portion is 72.96 percent of sodium nitrate and is 75.57 percent of calcium nitrate. Of the 20,000 pounds of the sodium nitrate in solution, 72.96 percent or 14,592 pounds is nitrate ion, and similarly, of the 10,000 pounds of the calcium nitrate in solution, 75.57 percent or 7,557 pounds is nitrate ion. The total nitrate ion in aqueous solution generated as byproduct by the facility is the sum of the nitrate ion in the two solutions, or 22,149 pounds.

PBT Chemical and Chemical Category Reporting Thresholds

| Chemical Name or Chemical Category Name | CAS Number or Mass DEP Chemical Category Code | Threshold (pounds, unless otherwise noted) |
|---|---|--|
| Aldrin | 309-00-2 | 100 |
| Benzo(g,h,i)perylene | 191-24-2 | 10 |
| Chlordane | 57-74-9 | 10 |
| Dioxin and dioxin-like compounds (manufacturing; and the processing or otherwise use of dioxin and dioxin-like compounds if the dioxin and dioxin-like compounds are present as contaminants in a chemical and if they were created during the manufacturing of that chemical). Category includes 17 specific compounds (refer to the TURA chemical list) | 1060 | 0.1 gram |
| Heptachlor | 76-44-8 | 10 |
| Hexabromocyclododecane (HBCD) category, includes 2 specific chemical compounds, CAS 3194-55-6 and | 1240 | 100 |

| Chemical Name or Chemical Category Name | CAS Number or Mass DEP Chemical Category Code | Threshold (pounds, unless otherwise noted) |
|--|---|--|
| CAS 25637-99-4. * Reportable under TURA effective reporting year 2018 | | |
| Hexachlorobenzene | 118-74-1 | 10 |
| Isodrin | 465-73-6 | 10 |
| Lead (this lower threshold does not apply to lead when contained in stainless steel, brass or bronze alloy) | 7439-92-1 | 100 |
| Lead compounds | 1026 | 100 |
| Mercury | 7439-97-6 | 10 |
| Mercury Compounds | 1028 | 10 |
| Methoxychlor | 72-43-5 | 100 |
| Octachlorostyrene | 29082-74-4 | 10 |
| Pendimethalin | 40487-42-1 | 100 |
| Pentachlorobenzene | 608-93-5 | 10 |
| Polychlorinated biphenyls (PCBs) | 1336-36-3 | 10 |
| Polycyclic aromatic compounds (PACs) category, includes 25 specific compounds (refer to the TURA chemical list that can be found on the website. | 1040 | 100 |
| Tetrabromobisphenol A | 79-94-7 | 100 |
| Toxaphene | 8001-35-2 | 10 |
| Trifluralin | 1582-09-8 | 100 |

TURA Higher Hazard Chemicals (1,000 lbs. Threshold)

| CAS | Chemical Name | Higher Hazard Designation Effective Date |
|----------|---------------------------------------|--|
| 7440439 | Cadmium | as of reports covering CY2008 |
| 1004 | Cadmium Compounds | as of reports covering CY2008 |
| 1216 | Chromium Compounds – Hexavalent only | as of reports covering CY2012 |
| 1016 | Cyanide Compounds | as of reports covering CY2016 |
| 68122 | Dimethylformamide/DMF | as of reports covering CY2016 |
| 50000 | Formaldehyde /methylene oxide | as of reports covering CY2012 |
| 7664393 | Hydrogen Fluoride | as of reports covering CY2016 |
| 75092 | Methylene Chloride/Dichloromethane | as of reports covering CY2014 |
| 106945 | n-Propyl Bromide/ 1-Bromopropane | as of reports covering CY2016 |
| 127184 | Perchlorethylene /Tetrachloroethylene | as of reports covering CY2009 |
| 584849 | Toluene-2,4-diisocyanate | as of reports covering CY2017 |
| 91087 | Toluene-2,6-diisocyanate | as of reports covering CY2017 |
| 26471625 | Toluene diisocyanate (mixed isomers) | as of reports covering CY2017 |
| 79016 | Trichloroethylene | as of reports covering CY2008 |

List of Chemicals for which a State Only Form R/A will be Automatically Generated

| CAS | Chemical Name | Explanation |
|---------|--------------------------------------|--|
| 7440439 | Cadmium | TURA higher hazard, as of reports covering CY2008 |
| 1004 | Cadmium Compounds | TURA higher hazard, as of reports covering CY2008 |
| 7440473 | Chromium | TURA includes qualifiers EPA TRI 313 does not – TURA covers only pure form and aerosol alloys, as of reports covering CY1995 |
| 1216 | Chromium Compounds – Hexavalent only | higher hazard as of reports covering CY2012 |
| 1217 | Chromium Compounds – non-hexavalent | TURA includes qualifiers that EPA TRI 313 does not – TURA covers only non-hexavalent chromium compounds |
| 7440484 | Cobalt | TURA includes qualifiers EPA TRI 313 does not – TURA covers only pure form and aerosol alloys as of reports covering CY1995 |
| 7440508 | Copper | TURA includes qualifiers TRI 313 lacks – TURA covers only if in aerosol, as of reports covering CY1999 |
| 1016 | Cyanide Compounds | TURA higher hazard as of reports covering CY2016 |
| 68122 | Dimethylformamide/DMF | TURA higher hazard as of reports covering CY2016 |
| 50000 | Formaldehyde /methylene oxide | TURA higher hazard as of reports covering CY2012 |
| 7647010 | Hydrochloric acid | EPA TRI 313 includes qualifiers as of 1996, that TURA does not –TURA covers all forms |
| 7664393 | Hydrogen Fluoride | TURA higher hazard as of reports covering CY2016 |
| 123319 | Hydroquinone | TURA includes qualifiers EPA TRI 313 does not – TURA covers manufactured only, as of reports covering CY1996 |
| 7439965 | Manganese | TURA includes qualifiers EPA TRI 313 does not – TURA covers only the pure metal and aerosol alloys as of reports covering CY1995 |
| 75092 | Methylene Chloride/Dichloromethane | TURA higher hazard as of reports covering CY2014 |
| 106945 | n-Propyl Bromide/ 1-Bromopropane | TURA higher hazard as of reports covering CY2016 |

| CAS | Chemical Name | Explanation |
|----------|--|---|
| 7440020 | Nickel | TURA includes qualifiers EPA TRI 313 does not – TURA covers only pure form and aerosol alloys as of reports covering CY1995 |
| 8014957 | Oleum (fuming sulfuric acid, sulfuric acid mixture with sulfur trioxide) | EPA TRI 313 includes qualifiers that AT TURA does not –TURA covers all forms |
| 127184 | Perchloroethylene /Tetrachloroethylene | TURA higher hazard as of reports covering CY2009 |
| 7723140 | Phosphorus | EPA TRI 313 includes qualifiers that AT TURA does not –TURA covers all forms |
| 7440224 | Silver | TURA includes qualifiers TRI 313 does not – TURA covers only if in aerosol, as of reports covering CY1999 |
| 7664939 | Sulfuric acid | EPA TRI 313 includes qualifiers as of CY1995 that TURA does not –TURA covers all forms |
| 584849 | Toluene-2,4-diisocyanate | TURA higher hazard as of reports covering CY2017 |
| 91087 | Toluene-2,6-diisocyanate | TURA higher hazard as of reports covering CY2017 |
| 26471625 | Toluene diisocyanate (mixed isomers) | TURA higher hazard as of reports covering CY2017 |
| 79016 | Trichloroethylene | TURA higher hazard as of reports covering CY2008 |

Guidance on Reporting Hexavalent Chromium (Cr(VI)) Compounds Use in Combustion and Welding Operations (Higher Hazard Substance, Effective Reporting Year 2012)

There are changes to the requirements for submitting Chromium compounds under Massachusetts Department of Environmental Protection (MassDEP) Toxics Use Reduction (TURA) Form S reports due on July 1, 2013, covering reporting year 2012. This document explains the new reporting requirements and mechanics and provides guidance on determining if combustion activities at your facility are likely to trip the reporting thresholds.

1. Higher Hazard Designation for Hexavalent Chromium (Cr(VI))

As of reporting year 2012: hexavalent chromium (Cr(VI)) compounds have been split off from all Chromium compounds, and designated as a higher hazard substance. This has the following implications.

REPORTING THRESHOLD REDUCED TO 1000 Cr(VI) Compounds:

Designation as a higher hazard substance lowers the reporting threshold from the current threshold of 25,000 pounds if the substance is manufactured or processed or 10,000 pounds if the substance is otherwise used to 1000 pounds. A Form S report is required for each higher hazard substance manufactured OR processed OR otherwise used at 1000 or more pounds in a calendar year. Note that these three types of use are NOT additive for the purposes of determining whether the threshold has been exceeded. For example, a facility that manufactured 700 pounds and otherwise used 350 pounds of formaldehyde would not be required to submit a Form S report on the substance, since neither type of use exceeded 1000 pounds.

Non-Cr(VI) chromium compounds are still reportable as the chromium compounds category under the original TURA reporting thresholds (25,000 pounds if manufactured, 25,000 pounds if processed, or 10,000 pounds if otherwise used).

NEW DEP CHEMICAL CATEGORY NUMBERS ASSIGNED FOR CHROMIUM COMPOUNDS

Every chemical category has to have a unique identifier in order to collect the chemical data. As a result new category numbers were created for the two new Chromium categories

- Use DEP Category # 1216 for Cr (VI) compounds
- Use DEP Category # 1217 for Non Cr(VI) Chromium Compounds

STATE ONLY FORM Rs ARE REQUIRED FOR Cr(VI), and CHROMIUM COMPOUNDS EXCLUDING CR(VI)

Designation as a higher hazard substance changes the mechanics of reporting Form R information to the MassDEP Toxics Use Reduction Program and to Environmental Protection Agency (EPA) Toxics Release Inventory (TRI). The TURA system will automatically generate State Only Form Rs for all substances for which the TURA reporting threshold is lower than the EPA

Toxics Release Inventory threshold, and for all substances which have different “qualifiers” under the TURA and TRI systems. Therefore, facilities will need to:

- Complete the “State Only Form R” for, Cr(VI) Compounds and Chromium Compounds excluding Cr(VI).
- Submit a separate Form R to the EPA TRI program for Chromium compounds. Note that the Chromium Compounds Form R submitted to EPA will cover ALL Chromium Compounds.

2. What are some examples of hexavalent chromium compounds?

Hexavalent chromium compounds are any chromium compounds in the +6 valence state.

This includes, but is not limited to, the following compounds:

Examples of Hexavalent Chromium Compounds

| CAS | Chemical Name |
|------------|----------------------------|
| 7789-98-9 | Ammonium Chromate |
| 7789-09-5 | Ammonium Dichromate |
| 10294-40-3 | Barium Chromate |
| 1189-85-1 | tert-Butyl Chromate |
| 13765-19-0 | Calcium Chromate |
| 14986-48-2 | Chromium (VI) chloride |
| 1333-82-0 | Chromium (VI) Trioxide |
| 18540-29-9 | Hexavalent Chromium |
| 7758-97-6 | Lead Chromate |
| 18454-12-1 | Lead Chromate Oxide |
| 1344-38-3 | Basic Lead Chromate Orange |
| 7789-00-6 | Potassium Chromate |
| 7778-50-9 | Potassium Dichromate |
| 7784-01-2 | Silver Chromate |
| 7775-11-3 | Sodium Chromate |
| 10588-01-9 | Sodium Dichromate |

| CAS | Chemical Name |
|------------|------------------------------|
| 7789-12-0 | Sodium Dichromate Dehydrate |
| 7789-06-2 | Strontium Chromate |
| 13530-65-9 | Zinc Chromate |
| 14018-95-2 | Zinc Dichromate ¹ |
| 7738-94-5 | Chromic Acid |

3. How are Chromium Compounds Used?

Industrial uses of hexavalent chromium compounds include chromate pigments in dyes, paints, inks, and plastics; chromates added as anticorrosive agents to paints, primers, and other surface coatings; and chromic acid electroplated onto metal parts to provide a decorative or protective coating.²

Cr(VI) Compounds can also be coincidentally manufactured during the consumption of fuel or when performing hot work" such as welding on stainless steel or melting chromium metal. In these situations, the chromium is not originally hexavalent, but the high temperatures involved in the process result in oxidation that converts the chromium to a hexavalent state.³ Filers using chromium compounds of any kind should consider whether they are being used in an oxidizing environment and thus could be generating hexavalent chromium compounds.

Chromium may also be coincidentally manufactured during the combustion of fuel.

Note that the information that follows is provided for general guidance – facilities are required to use the best readily available data applicable to their operations for threshold determinations.

Cr(VI) USE IN COMBUSTION PROCESSES

Manufacturing: Facilities will likely coincidentally manufacture Cr(VI) Compounds through combustion and flue gas desulfurization in sufficient quantities to trip the 1,000-pound reporting threshold. In general, the quantities of Cr(VI) compounds and formaldehyde manufactured, processed, or otherwise used at a facility will be dependent on a number of factors, including the type of fuel combusted (coal, oil, gas), the type of combustor, and combustion conditions (e.g., temperature, air/fuel ratio). Information that can be used to estimate the coincidental manufacture of Cr(VI) Compounds during combustion can be found in the references cited at the end of this document.

Processing: "Processing" means preparing a TURA reportable chemical or a mixture or other trade name product containing a TURA reportable chemical for distribution in commerce. Chromium compounds in fly ash and ash from coal- and oil-fired facilities are likely to include

¹ http://www.osha.gov/dts/chemicalsampling/data/CH_228697.html

² <http://www.osha.gov/SLTC/hexavalentchromium/index.html>

³ <http://www.osha.gov/SLTC/hexavalentchromium/index.html>

Cr(VI) compounds. Any fly ash that is shipped off site for use or recycling by another facility is being “processed” and unless the *de minimis* exemption applies, the Cr(VI) compounds in the ash must be counted toward the 1000 pound “processing” threshold. (Note however that any ash recovered for use onsite the material has NOT been prepared for distribution in commerce and thus is not counted toward the processing threshold.)

The *de minimis* exemption applies to toxic substances that are contained in materials distributed in commerce offsite for direct use or reuse. A material is considered to be transferred offsite for direct reuse if the materials will be directly used in an operation or application without any recovery or other extraction of contaminants. Toxic substances that are present in a material below the *de minimis* concentration are not counted toward the 1000 pound “processing” threshold.

For example, ash sent off-site for concrete manufacturing is a ‘direct reuse’. The *de minimis* concentration for Cr(VI) compounds and formaldehyde is 0.1 percent. Therefore, if the ash being sent off for direct reuse in concrete manufacture is less than 0.1 % Cr(VI) Compounds, the Cr(VI) Compounds in the ash does not need to be counted toward the 1000 pound “processing” threshold. If the concentration is >0.1%, then the entire amount of Cr(VI) Compounds in the ash must be counted toward the 1000 pound “processing” threshold.

Because transfers offsite for recycling must undergo a subsequent recovery step, the material to be recycled is considered a waste and is not eligible for the *de minimis* exemption. All Cr(VI) contained in such materials must be counted toward the processing threshold, regardless of its concentration.

Otherwise Use: A substance is “otherwise used” in a production process if it is neither manufactured nor incorporated into the final product. Therefore, any contaminants contained in fuel are considered “otherwise used” in the combustion process. The *de minimis* concentration applies to materials that are otherwise used. Materials below the *de minimis* concentrations (0.1 % for Cr (VI) Compounds and for formaldehyde) do not need to be counted toward the 1000 pound “otherwise use” threshold. However, the entire quantity of substances that are present in concentrations above the *de minimis* level must be counted toward the 1000 pound “otherwise use” threshold

- Cr(VI) Compounds in fuel: Unless a facility has information indicating otherwise, they may assume that Cr(VI) compounds in coal and distillate oil are below *de minimis* levels.
- **Cr(VI) compounds in ash or other wastes that are received from off-site and disposed, stabilized (without subsequent distribution in commerce), or treated for destruction on-site.** These materials are “wastes” and as such are not subject to the *de minimis* exemption. Facilities engaged in these operations must count the entire amount of Cr(VI) Compounds in the ash toward the 1000 pound “otherwise use” threshold.

REFERENCES FOR QUANTIFYING Cr(VI) CONCENTRATIONS IN FUEL, EMISSIONS, AND ASH.

It is the responsibility of each facility to determine the best readily available data applicable to their operations. The methods and sources of data for quantifying Cr(VI) compounds use include, but are not limited to, the following –

1. Fuel-specific data for the fuels combusted (e.g., obtained from supplier).
2. Facility-specific monitoring data and/or emission factors.
3. Facility-specific waste (e.g., ash) sampling data – the literature contains a number of studies and other information sources that show that the fly ash from coal- and oil-fired facilities is likely to contain Cr(VI) compounds. Among these references are –
 - a. Cr(VI) speciation data for ash from coal- and oil-fired electric generation facilities discussed in EPA’s *National Emission Standards for Hazardous Air Pollutants from Coal- and Oil-fired Electric Utility Steam Generating Units and Standards of Performance for Fossil-Fuel-Fired Electric Utility, Industrial-Commercial-Institutional, and Small Industrial-Commercial-Institutional Steam Generating Units – Panel Report*, pp. 70 – 76, 2/16/11. (<https://www.epa.gov/reg-flex/sbar-panel-national-emission-standards-hazardous-air-pollutants-neshap-coal-and-oil-fired>).
 - b. *Nickel and Chromium Speciation of Residual Oil Combustion Ash*, K. C. Galbreath, C. J. Zygarlicke, D. L. Toman, F. E. Huggins, G. P. Huffman, **Combustion Science and Technology**, Vol. 134, Iss. 1-6, 1998.
 - c. *Chromium Speciation in Coal and Biomass Co-Combustion Products*, Arthur F. Stam, Ruud Meij, Henk te Winkel, Ronald J. van Eijk, Frank E. Huggins, Gerrit Brem, **Environ. Sci. Technol.**, **2011**, 45 (6), 2450-2456.
4. For EPRI members – the PISCES database (provides emission factors and models to calculate air emissions), and Toxics Release Inventory for Power Plants (TRIPP) software.
5. EPA’s *EPCRA Section 313 Industry Guidance – Electricity Generating Facilities*.
6. EPA emission factors from EPA’s *Compilation of Air Pollutant Emission Factors (AP-42)*, 5thed. - *Chapter 1, External Combustion Sources*. These factors are based on a limited number of samples and may not reflect more accurate information available to the facility for the particular type of fuel combusted and pollution control devices used.

Cr(VI) USE IN WELDING:

Emission Factors

The following emission factors were reported in the literature. For more information on electrode types, rod diameters, test conditions and analytical methods, please see the appropriate reference.

| Welding process and electrode | Heung, et al Cr(VI) (g/kg) | EPA HAP Emission Factors (AP-42) Cr(VI)(g/kg) |
|----------------------------------|-------------------------------|---|
| SMAW - E316L | 0.179 | 0.332 |
| SMAW – E310L | n/a | 1.88 |
| SMAW – E308 | n/a | 0.359 |
| GMAW – ER316 | 0.0194 | 0.01 |
| FCAW with shield gas – E309LT | 0.0146 | n/a |
| FCAW without shield gas – E309LT | 0.2557 | n/a |
| FCAW - E316 | n/a | 0.14 |

SMAW - Shielded Metal Arc Welding

GMAW – Gas-Metal Arc Welding

FCAW – Flux-Cored Arc Welding

Calculating quantities of hexavalent chromium compounds manufactured during welding operations to determine if the 1000 lb. reporting threshold is exceeded:

Threshold for TURA reporting and planning: 1000 lbs. hexavalent chromium compounds

Total lbs. of electrode used x emission factor (lbs. Cr(VI)/ 1000 lbs. electrode) = lbs. Cr(VI)

If assumed that all Cr(VI) compounds are CrO₃, (particulate Cr compounds are typically oxides and halides) then compounds would be approximately twice the weight of the Cr(VI) (Cr = 52, O₃ = 48). Estimate 520 lbs. threshold for Cr(VI) as HHS.

e.g., for largest emission factor – SMAW- E310L, 1.88 lb./1000 lbs.:

520 lbs. Cr(VI) = (1.88 lbs./1000 lbs.) x electrode used (lbs.)

Electrode use to reach 500 lbs. Cr(VI) manufactured during welding = 277,000 lbs.

References:

U.S. Environmental Protection Agency “Air Pollutant Emission Factors,” Volume I, 5th Edition (AP-42), Chapter 12: Metallurgical Industry, Section 19: Electric Arc Welding, 1995.

<http://www.epa.gov/ttn/chief/ap42/ch12/final/c12s19.pdf>

U.S. Environmental Protection Agency Office of Air Quality Planning and Standards, Emission Inventory Branch, “Development of Particulate and Hazardous - Emission Factors for Electric Arc Welding” (AP-42, Section 12.19), MRI Project No. 4601-02, May 20, 1994.

<http://www.epa.gov/ttn/chief/ap42/ch12/bgdocs/b12s19.pdf>

Heung, William, et al, "Emissions of Chromium (VI) from arc welding," Journal of the Air and Waste Management Association, Feb 1, 2007.

Guidance on Reporting Formaldehyde as Higher Hazard Substance (Effective Reporting Year 2012) and Quantifying its Use in Combustion Operations

There are changes to the requirements for submitting Formaldehyde under MassDEP Toxics Use Reduction (TURA) Form S reports due on July 1, 2013, covering reporting year 2012. This document explains the new reporting requirements and mechanics and provides guidance on determining if combustion activities at your facility are likely to trip the reporting thresholds.

1. Higher Hazard Designation

As of reporting year 2012, formaldehyde has been designated as a higher hazard substance with the following implications for reporting.

REPORTING THRESHOLD REDUCED TO 1000 POUNDS

Designation as a higher hazard substance lowers the reporting threshold from the current threshold of 25,000 pounds if the substance is manufactured or processed or 10,000 pounds if the substance is otherwise used to 1000 pounds. A Form S report is required for each higher hazard substance manufactured OR processed OR otherwise used at 1000 or more pounds in a calendar year. Note that these three types of use are NOT additive for the purposes of determining whether the threshold has been exceeded. For example, a facility that manufactured 700 pounds and otherwise used 350 pounds of formaldehyde would not be required to submit a Form S report on the substance, since neither type of use exceeded 1000 pounds.

STATE ONLY FORM R_s ARE REQUIRED FOR FORMALDEYDE

Designation as a higher hazard substance changes the mechanics of reporting Form R information to the MassDEP Toxics Use Reduction Program and to EPA's TRI. The TURA system will automatically generate State Only Form R_s for all substances for which the TURA reporting threshold is lower than the EPA Toxics Release Inventory threshold, and for all substances that have different "qualifiers" under the TURA and TRI systems. Therefore, facilities will need to:

- Complete the "State Only Form R" for formaldehyde
- Submit a separate Form R to the EPA TRI program

2. What are Common Synonyms for formaldehyde

Formaldehyde (CAS#50-00-0) has several synonyms, including:

- Formalin
- Formol
- Methylene Glycol
- Methyl Aldehyde
- Methylene Oxide

3. How Is Formaldehyde Commonly Used?

Formaldehyde is primarily used in the manufacture of wood adhesives applied to plywood, particleboard and other manufactured wood products, and in formaldehyde-based resins.⁴ Other significant uses of formaldehyde include the manufacture of other chemicals, plastics and coatings, embalming and fertilizers.

Formaldehyde is generated in processes that use paraformaldehyde (CAS# 30525-89-4), formalin, or trioxane.

Formaldehyde may be coincidentally manufactured during the combustion of fuel.

4. Quantifying Formaldehyde Use in Combustion

Formaldehyde use occurs in combustion processes. In general, the quantities formaldehyde manufactured, processed, or otherwise used at a facility during combustion will be dependent on a number of factors, including the type of fuel combusted (coal, oil, gas), the type of combustor, and combustion conditions (e.g., temperature, air/fuel ratio).

Note that the information that follows is provided for general guidance – facilities are required to use the best readily available data applicable to their operations for threshold determinations.

MANUFACTURING:

Based on the EPA's AP-42 emission factors, 1000 or more pounds of formaldehyde are likely to coincidentally be manufactured if annual fuel consumption is equal to or greater than the amounts listed below:

- Coal – 4.2 million tons
- No. 6 fuel oil – 30.3 million gallons
- No. 2 fuel oil – 16.4 million gallons
- Natural gas – 6,450 million ft³

Additional data sources on the coincidental manufacture of formaldehyde during combustion can be found in the references cited at the end of this document.

OTHERWISE USE

A substance is “otherwise used” in a production process if it is neither manufactured nor incorporated into the final product. Therefore, any contaminants contained in fuel are considered “otherwise used” in the combustion process. The *de minimis* concentration applies to materials that are otherwise used. Materials below the *de minimis* concentrations (0.1 % for formaldehyde) do not need to be counted toward the 1000 pound “otherwise use” threshold.

⁴Massachusetts Toxics Use Reduction Institute, Five Chemicals Alternatives Assessment Study: Chapter 4 – *Formaldehyde*. Available at: https://www.turi.org/TURI_Publications/TURI_Methods_Policy_Reports/Five_Chemicals_Alternatives_Assessment_Study.2006/Chapter_4_Formaldehyde.

However, the entire quantity of substances that are present in concentrations above the *de minimis* level must be counted toward the 1000 pound “otherwise use” threshold

- **Formaldehyde** is not likely to be present in fuels or ash above the *de minimis* level

REFERENCES FOR QUANTIFYING FORMALDEHYDE EMISSIONS FROM THE COMBUSTION OF FUEL

It is the responsibility of each facility to determine the best readily available data applicable to their operations. The methods and sources of data for quantifying formaldehyde use include, but are not limited to, the following:

1. Fuel-specific data for the fuels combusted (e.g., obtained from supplier).
2. Facility-specific monitoring data and/or emission factors.
3. For EPRI members – the PISCES database (provides emission factors and models to calculate air emissions), and Toxics Release Inventory for Power Plants (TRIPP) software.
4. EPA’s *EPCRA Section 313 Industry Guidance – Electricity Generating Facilities*.
5. EPA emission factors from EPA’s *Compilation of Air Pollutant Emission Factors (AP-42)*, 5th ed. - Chapter 1, *External Combustion Sources*. These factors are based on a limited number of samples and may not reflect more accurate information available to the facility for the particular type of fuel combusted, and pollution control devices used.

Guidance on Quantifying Use and Reporting Cyanide Compounds under the Toxics Use Reduction Act

As of reporting year 2016, Cyanide Compounds (TURA chemical category # 1016) has been designated as a Higher Hazard Substance (HHS), lowering the reporting threshold to 1,000 pounds. The new threshold will apply to cyanide compounds use in calendar year 2016, which will be reported on Form S reports due July 1, 2017. This document provides guidance on determining if activities at your facility are likely to trip the reporting thresholds and how cyanide use is reported in compliance with the Toxics Use Reduction Act, including how cyanide use is reported on Form S.

Definition of the Category

Cyanide compounds include any chemical substance with the chemical formula: $X^+ CN^-$ where $X = H^+$ or any other group where a formal dissociation can be made. Examples include potassium cyanide (KCN) and calcium cyanide ($Ca(CN)_2$). Consistent with the TRI cyanide category (#N106) definition, hydrogen cyanide and ethyl cyanide are reported as individual chemicals, and are not included in the category. They are reported under their individual CAS numbers.

Reporting Thresholds

For use during calendar year 2015, continue to observe the reporting thresholds of 25,000 pounds for cyanide compounds manufactured or processed and 10,000 pounds for cyanide compounds otherwise used. For use during calendar year 2016, the thresholds will be 1,000 pounds for each of these, for reporting on Form S under TURA, but will remain unchanged for federal TRI reporting on Form R. Note that these three types of use are NOT additive for the purposes of determining whether the threshold has been exceeded. For example, a facility that manufactured 700 pounds and otherwise used 350 pounds of cyanide compounds would not be required to submit a Form S report on the substance, since neither type of use exceeded 1,000 pounds. However, if more than one cyanide compound was used for the same type of use then those quantities would be additive (e.g. processing 700 pounds of zinc cyanide and processing 400 pounds of copper cyanide trips the 1,000-pound threshold).

Because the federal and state thresholds for cyanide compounds are different, a “State-Only Form R” is submitted to the state along with the Form S when use exceeds the lower state TURA reporting threshold. The TURA eDEP system will automatically generate State Only Form Rs for these situations. Submit a separate Form R to the EPA TRI program when federal thresholds are exceeded.

Report What Enters, Leaves and is Manufactured During Processing

For reporting on Form S, report not only on what enters and leaves the process, but also on what is manufactured within the process. Compounds leaving the production process/unit must be counted as byproduct before entering a wastewater treatment process.

Common Uses of Cyanide Compounds

Cyanide compounds are primarily used in Massachusetts for electroplating and stripping of metallic surfaces. Other possible uses of cyanide compounds include the extraction and refining of precious metals and the synthesis of nitrogen-containing organic chemicals.

Common Forms of Cyanide Compounds

Common cyanide compounds include cyanide salts of sodium, potassium, calcium, iron, zinc, copper, silver, cadmium, and gold. The anhydrous salts may be used directly with water to make plating baths that can be augmented with pure metal anodes. Sometimes a concentrated gold cyanide solution is used directly in plating baths rather than handling the more expensive pure metal form.

Often when plating a metal onto another metal product surface, an aqueous solution of the metal cyanide, sodium or potassium cyanide, and non-cyanide additives are used. Sometimes metal cyanide solution is added to the bath as the metal is plated out, especially with precious metals such as gold. More often the desired metal concentration of the solution is maintained by continuously dissolving the pure metal from the anode. Over time contaminants accumulate in the solution and cause inferior plating results. In this case the plating bath may be dumped for disposal or reclamation.

[NOTE: Atomic Weight of Copper is 63.546 and Molecular Weight of Cuprous Cya: Atomic9.563
Molecular weight of Sodium Cyanide is 49.007]

Cyanide Compound Example: Electroplating

A **300-gallon** copper plating tank operates with **1,000 Liters of solution**. A fresh solution is made up at the beginning of the calendar year with **60 kilograms of Copper Cyanide and 94 kilograms of Sodium Cyanide**.

Over the course of the year, **323 kilograms** of copper are consumed from the anode, creating **455 kg of copper cyanide** as **323 kilograms** of copper are plated from the solution onto steel parts. Also, **25 Kg of Cyanide salts** have been added to maintain tank concentrations due to drag out losses.

At the end of the year the plating bath has accumulated contaminants and needs replacement.

Data for Byproduct Cyanide Compounds = 179 kg x 2.20 = 394 lbs.

Data for Form S, Section 1: Facility-Wide Use of Listed Chemical (Cyanide Compounds

| | |
|-----------------------|--|
| c. Manufactured | 1,001 pounds of Copper Cyanide (455 kg x (2.20 lb/kg)) |
| d. Processed | 132 pounds of Copper Cyanide (60 kg x (2.20 lb/kg)) <i>When a given listed substance is introduced into production anywhere at the facility, it is counted only once at the facility level, regardless of how many times that listed substance is used, recycled or reused onsite. It is reported under the category that first trips the reporting threshold. Therefore, the 1,001 pounds of copper cyanide that was manufactured is reported as "manufactured". It is not included in the "processed" total because it was already reported as manufactured. (However, the total amount (1,133 pounds) manufactured and processed IS included in the production unit level reporting, and in the reported use range code.)</i> |
| e. Otherwise used | 262 pounds of Sodium Cyanide (94 kg + 25 kg) = 119 kg x (2.20 lb/kg) |
| f. Byproduct | 394 pounds CuCN and NaCN (179 kg x (2.20 lb/kg)) |
| g. Shipped as Product | 0 pounds |

Form S, Section 2: Materials Balance

b. Chemical was Consumed or Transformed = 1,001 pounds of Copper Cyanide

Form S, Section 4: Toxics Use by Production Unit

b. Quantity Chemical Code: 1. ≤ 5,000 lbs. (1,133 lbs. ≤ 5,000 lbs.)

RELEVANT REFERENCES

Background Document, Designation of Cyanide Compounds

TURI Summary of Policy Analysis for Cyanide Compounds, Aug. 12, 2014

<http://www.turi.org/content/download/9405/164669/file/Policy%20analysis%20cyanide%20compounds%20%20August%202014.pdf>

Massachusetts Chemical Fact Sheet for Cyanide Compounds

http://www.turi.org/TURI_Publications/TURI_Chemical_Fact_Sheets/Cyanide_and_Cyanide_Compounds/Cyanide_and_Cyanide_Compounds_Fact_Sheet

1998 EPCRA Section 313 Questions and Answers

Question Numbers 137, 138, 111, 416

http://www.epa.gov/sites/production/files/2015-05/documents/qas_1998.pdf

Electroplating Engineering Handbook by Lawrence J. Durney, Van Nostrand Reinhold Company, 1984

Advanced Surface Technology, Volume 1 by Per Moller and Lars Pleth Nielsen

Published by NASF and AESF Foundation, Copyright 2013, ISBN 978-87-92765-23-9

Guidance on Reporting Hydrofluoric Acid as a Higher Hazard Substance Under the Toxics Use Reduction Act

As of reporting Year 2016, Hydrofluoric Acid, also known as Hydrogen Fluoride (HF) – CAS # 7664-39-3 has been designated as a higher hazard substance (HHS) under TURA, lowering the reporting threshold to 1,000 pounds. This document explains the reporting requirements and provides general reporting guidance for HF.

REPORTING THRESHOLD LOWERED TO 1,000 POUNDS

Designation as a higher hazard substance lowers the reporting threshold from the current thresholds of 25,000 pounds if the substance is manufactured or processed; and 10,000 pounds if the substance is otherwise used, to 1,000 pounds for each of the three uses. A Form S report is required for each higher hazard substance used at 1,000 or more pounds in a calendar year. Note that these three types of use are NOT additive for the purposes of determining whether the threshold has been exceeded. For example, a facility that manufactured 700 pounds and otherwise used 350 pounds of hydrogen fluoride would not be required to submit a Form S report on the substance, since neither type of use exceeded 1,000 pounds.

USE STATE-ONLY FORM Rs

The TURA e-DEP system will automatically generate State Only Form Rs for all substances for which the TURA reporting threshold is lower than the EPA Toxics Release Inventory threshold, and for all substances that have different “qualifiers” under the TURA and TRI systems. Of course, if federal thresholds are exceeded, submit a separate Form R to the EPA TRI program and generate a State Only Form R as well.

GENERAL REPORTING GUIDANCE

1. How Is Hydrofluoric Acid Commonly Used in Massachusetts?

Hydrofluoric acid is primarily used in Massachusetts for metal cleaning (pickling and desmutting), and etching applications, or is coincidentally manufactured by facilities.

2. Properties of Hydrofluoric Acid

Anhydrous hydrofluoric acid or hydrogen fluoride is a liquid that easily vaporizes at room temperature. Aqueous solutions of hydrofluoric acid are commonly sold in concentrations from 70% to 38% (by weight). Boiling temperatures range from 67 F for anhydrous to 235 F for 35% hydrofluoric acid.

3. How do I determine if I trip the reporting threshold?

Processing HF: Facilities producing specialty blends of fluoride chemicals will primarily report hydrogen fluoride as processed and occasionally as manufactured.

Example 1: The dilution of 1,430 pounds of 70% hydrofluoric acid to 49% hydrofluoric acid for resale would be considered *processing* 1,001 pounds of HF.

Example 2: If 1,430 pounds of 70% hydrofluoric acid is used to manufacture fluoroboric acid, report 1,001 pounds of HF as *processed*.

Example 3: If 2043 pounds of 49% hydrofluoric acid is used in solutions to remove oxides from stainless steel, report 1001 pounds HF as otherwise used.

Processing or Manufacturing HF from Ammonium Bifluoride or Other Fluoride Salts: When dry ammonium bifluoride (ABF) contacts water, it generates hydrofluoric acid. The hydrogen fluoride derived from fluoride salts (such as ABF) is considered *manufactured*. (EPA guidance 745-R-00-005)

Ammonium bifluoride used (*processed*) in dry blends for resale are not likely to have reportable quantities of HF. However, ammonium bifluoride added to water will *manufacture* HF. For example, if ABF is added to water with other proprietary constituents for resale, ABF could *manufacture* reportable quantities of HF depending upon the pH of the solution and other constituents that could affect the dissociation of ammonium bifluoride.

For example, HF for buffered etching solutions may be produced from ammonium bifluoride (CAS 1341-49-7) or ammonium fluoride (CAS 12125-01-8). In crystalline form these two chemicals may sublime to produce ammonia and HF gases. Some companies, however, prefer to handle and store this solid form rather than a concentrated solution of HF. In solution, ammonium bifluoride can typically produce up to **35%** of its weight as hydrogen fluoride. That is, 2,857 pounds of NH_5F_2 can produce 1,000 pounds of HF (and 1,857 pounds of NH_4F). Ammonium fluoride (NH_4F) is considered a neutral salt, but in the presence of a stronger acid is capable of producing up to **54%** of its weight in HF. That is, 1,852 pounds of NH_4F could produce up to 1,000 pounds of HF if driven by the presence of another acid in the solution or an energy source. Thus, if ammonium bifluoride is put into solution with a stronger acid, up to 70% of its weight can be produced as hydrogen fluoride (e.g., 2,000 lbs. HF from 2,857 lbs. of NH_5F_2).

Example: In the calendar year 3,000 pounds of ammonium bifluoride is consumed in an etching bath.

35% of 3,000 pounds *manufactures* 1,050 pounds of HF that exceeds the 1,000-pound threshold. These 1050 pounds of HF are also *otherwise used*. However, under TURA, when a given listed substance is introduced into production anywhere at the facility, it is counted *only once at the facility level*, regardless of how many times that listed substance is used, recycled or reused onsite. Report the first use category that trips the threshold. For example, if 1,050 pounds of HF is manufactured at the facility, it is reported as “manufactured”. This amount is not also reported as “otherwise used” because it was already reported as manufactured. However, at the *production unit level*, the reportable substance is counted every time it is used (and if non integrally recycled, reused) in the process. In this case, the use range code reported for the production unit would reflect 2,100 pounds -- the sum of the amount manufactured and otherwise used.

Otherwise Use of HF: A substance is *otherwise used* in a production process if it is neither manufactured nor incorporated into the final product. The *de minimis* concentration applies to materials that are otherwise used. Materials below the *de minimis* concentrations (1.0 % for

hydrofluoric acid) do not need to be counted toward the 1,000 pound *otherwise used* threshold. However, the entire quantity of substances that are present in concentrations above the *de minimis* level must be counted toward the 1,000 pound *otherwise use* threshold.

4. Quantifying Hydrofluoric Acid Use in Combustion

Hydrofluoric acid is often *manufactured* in combustion processes, because. Fluoride compounds in fuels such as oil or municipal waste can be converted to hydrogen fluoride during combustion. The quantity of hydrogen fluoride manufactured at a facility during combustion will depend on a number of factors, including the type of fuel combusted (e.g., oil or municipal waste), the type of combustor, and combustion conditions (e.g., temperature and air/fuel ratio). Note that the information that follows is provided for general guidance – facilities are required to use the best readily available data applicable to their operations for threshold determinations.

Based on the EPA's AP-42 emission factors, 1,000 or more pounds of hydrofluoric acid are likely to be coincidentally *manufactured* if annual fuel consumption is greater than 26,800,000 gallons (No. 6 oil).

Hydrofluoric acid is also coincidentally generated during municipal waste combustion. EPA has not published emission factors for HF from municipal waste combustion. AP-42 has a general statement about the variability of acid gas emissions including HF. Given the variability in HF amounts, it is incumbent on municipal waste combustors to make their own best engineering judgment on how much HF is coincidentally manufactured in the combustion process. According to one Emission Calculation, prepared by Malcolm Pirnie, for the Palm Beach Renewable Energy Facility permit application, that MWC facility will exceed the 1000-lb. HF threshold when it processes 36,630 ton/year (100 ton/day). [Ref.-13 Appendix B Emission Calculations for Palm Beach Renewable Energy Facility No. 2]

Additional data sources on the coincidental manufacture of Hydrofluoric Acid during combustion can be found in the references cited at the end of this document. *De minimis* exemptions do not apply to manufactured chemicals.

REFERENCES

It is the responsibility of each facility to determine the best readily available data applicable to their operations. The methods and sources of data for quantifying hydrochloric acid use include, but are not limited to, the following –

1. TURI Chemical Fact Sheet for Hydrofluoric Acid (August 2019)

https://www.turi.org/TURI_Publications/TURI_Chemical_Fact_Sheets/Hydrogen_Fluoride_Fact_Sheet/Hydrogen_Fluoride_Fact_Sheet

2. "Etch Rates for Micromachining Processing" by Kirt R. Williams and Richard S. Muller

Journal of Microelectromechanical Systems, Vol 5, No 4, December 1996

3. Safety of Hydrofluoric Acid vs. AmmoniumBifluoride

<http://www.finishing.com/94/62.shtml>

4. Fuel-specific data for the fuels combusted (e.g., obtained from supplier).
5. Facility-specific monitoring data and/or emission factors.
6. AP-42: Table 1.1-15 Emission Factors for Coal Combustion
<http://www.epa.gov/ttn/chief/ap42/ch01/final/c01s01.pdf>
7. AP-42: Refuse Combustion -2.1.3.3 and subsequent tables
<http://www.epa.gov/ttn/chief/ap42/ch02/final/c02s01.pdf>
8. Waste Treatment and Disposal / Paul T. Williams, John Wiley & Sons, copyright 2005 –
chlorine and fluorine in municipal waste
9. For EPRI members – the PISCES database (provides emission factors and models to calculate air emissions), and Toxics Release Inventory for Power Plants (TRIPP) software.
10. EPA's *EPCRA Section 313 Industry Guidance – Electricity Generating Facilities*.
11. EPA emission factors from EPA's *Compilation of Air Pollutant Emission Factors (AP-42)*, 5th ed. - *Chapter 1, External Combustion Sources*. These factors are based on a limited number of samples and may not reflect more accurate information available to the facility for the particular type of fuel combusted and pollution control devices used.
12. *Health Effects of Municipal Waste Incineration*, Editors Holly A. Hattemer-Frey and Curtis Travis, ISBN 0-8493-4933-8, CRC Press, 1991 copyright, Table 17; *MSW Incineration Emission Factors*.

Guidance for Reporting Toluene Diisocyanate (TDI) as a Higher Hazard Substance under TURA

The following three individually listed diisocyanates have been designated as higher hazard substances, effective reporting year 2017, with a reporting threshold of 1,000 pounds:

- 2,4-Toluene Diisocyanate (2,4-TDI) – CAS 584-84-9
- 2,6-Toluene Diisocyanate (2,6-TDI) – CAS 91-08-7
- Toluene Diisocyanate (TDI-mixed isomers) – CAS 26471-62-5

For purposes of reporting under EPCRA Section 313 and TURA, “toluene diisocyanate (mixed isomers)” includes any possible mixture of any toluene diisocyanates in which the isocyanate groups are separated by one carbon in the ring (i.e., are one/three to each other). This listing includes the 2,4-, 2,6-, and 3,5- isomers of toluene diisocyanate (TDI).

1. A separate report and fee is required for each TDI isomer for which the 1000-lb threshold is exceeded.
2. Calculate the threshold for each CAS number separately.
 - a. The total quantity of TDI mixed isomers is calculated as the sum of ALL TDI isomers (not just 2,4 TDI and 2,6 TDI) present in the mixture at concentrations above the *de minimus* level.
 - b. If using both TDI mixed isomers and one or both of the pure forms, do NOT add the amount of the pure form present in the mixed isomers to the total amount of the pure form used. Include only the amount of the pure form that was introduced into production.
 - c. If using both TDI mixed isomers and one or both of the pure forms, do NOT add the amount of the pure form used to the total amount of the mixed isomers used. Include only the amount of the mixed isomers introduced into production.
3. State only Form Rs are required for these substances. Submit a separate federal Form R to EPA if the federal threshold for any of these substances is also exceeded.

Rules for Reporting the Use of Ammonia and Ammonium Hydroxide under TURA

To further clarify the reporting of ammonia and ammonium hydroxide under TURA, MassDEP recommends that reporting be consistent with EPCRA. Thus, there will not be a State-only Form R/A required for ammonium hydroxide, and TURA filers should not file a Form S for ammonium hydroxide (CAS# 1336-21-6). Only one fee will be required to the state for the reporting of ammonia as ammonium hydroxide. MassDEP interprets ammonium hydroxide to be equivalent to aqueous ammonia (as does EPCRA), and 10% of aqueous ammonia (CAS# 7664-41-7) is reportable under TURA, effective reporting year 2000. Please refer to the EPCRA Section 313 Guidance for Reporting Aqueous Ammonia, Revised April 2018, EPA 745-R-00-005, at: https://ofmpub.epa.gov/apex/guideme_ext/f?p=guideme:gd-title:::::title:ammonia.

The following is quoted from #451, EPCRA Section 313 Questions and Answers, December 1998, EPA 745-B-98-004:

“...The chemical ammonium hydroxide (NH₄OH) is a misnomer. It is a common name used to describe a solution of ammonia in water (i.e., aqueous ammonia), typically a concentrated solution of 28 to 30 percent ammonia. EPA has consistently responded to questions regarding the reportability of these purported ammonium hydroxide solutions under the EPCRA Section 313 ammonia listing by stating that these are 28 to 30 percent solutions of ammonia in water and that the solutions are reportable under EPCRA Section 313 ammonia listing. For a more detailed discussion, see page 34175 of the Federal Register final rule of June 30, 1995 (60 FR 34172).

Facilities should use the percent total ammonia specified on the label of ammonium hydroxide solutions they purchase to determine the total ammonia content in these solutions. Ammonium hydroxide has the chemical formula NH₄OH; however, as mentioned above, strong evidence indicates that the species NH₄OH does not exist. Bottles of concentrated aqueous ammonia purchased from chemical supply companies are almost always labeled ammonium hydroxide. These solutions primarily consist of molecules of NH₃ dissolved in water (along with small amounts of ionized ammonia)...”

Please note that different chemical suppliers will reference the % of ammonia in different ways. Therefore, it is recommended that facilities contact their chemical suppliers to specify the amount of ammonia per gallon. This question could be specified in “percent by weight per gallon” or in “number of pounds per gallon” of solution, for example.

✓**Example 1**

Facility otherwise uses 1,000,000 pounds of 30% solution by weight of ammonium hydroxide (30% ammonia by weight).

$$1,000,000 \text{ pounds} \times 0.30 = 300,000 \text{ pounds of ammonia}$$

Only 10% of ammonia is reportable on Form R per EPA Guidance for Reporting Aqueous Ammonia

$$300,000 \times 0.10 = 30,000 \text{ pounds of ammonia}$$

This facility would complete one Form S and one Form R for 30,000 pounds of reportable ammonia (see EPCRA Guidance for Reporting Aqueous Ammonia).

✓**Example 2**

54,231 gallons of aqueous ammonia (19.0%)

$$54,231 \text{ gallons} \times 8.34 \text{ pounds/gallon} \times 0.935 \text{ specific gravity}$$

$$= 422,888 \text{ pounds aqueous ammonia} \times 19.0\%$$

$$80,349 \text{ pounds ammonia} \times 10\% \text{ reportable ammonia} = 8,035 \text{ pounds ammonia}$$

This facility does not meet TURA or TRI reporting thresholds.

Guidance for Reporting C1-C4 Halogenated Hydrocarbons/Halocarbons Not Otherwise Listed (C1-C4 NOL)

For the 2019 Reporting Year, C1-C4 Halogenated Hydrocarbons/Halocarbons, NOL category are reportable under TURA. This category is defined as chemicals with 4 or fewer carbons, at least one halogen, and only hydrogen as the other constituent, that are not already individually listed on the TURA chemical list. This includes fully halogenated chemicals that contain no hydrogen. Halogens are further defined as fluorine, chlorine, bromine, and iodine substances that meet the definition of this category, but are already individually listed on the TURA list, and will have **no change** in reporting. Continue reporting them individually. The second list of substances should be reported as part of the category. This list is not exhaustive. Further, this list is organized so that substances that have been reported to be in commerce (through the TSCA CDR) are ordered first (and shaded).

Substances to Continue Reporting Individually

| CAS # | Name | Synonym |
|---------|-----------------------|---|
| 56-23-5 | Carbon tetrachloride | Tetrachloromethane |
| 67-66-3 | Chloroform | Methane, trichloro- |
| 67-72-1 | Hexachloroethane | Perchloroethane |
| 71-55-6 | 1,1,1-Trichloroethane | Methyl chloroform |
| 74-83-9 | Bromomethane | Methyl bromide |
| 74-87-3 | Chloromethane | Methane, chloro-, Methyl chloride |
| 74-88-4 | Methyl iodide | Monoiodomethane |
| 74-95-3 | Methylene bromide | Dibromomethane |
| 75-00-3 | Chloroethane | Ethane, chloro-, Ethyl chloride |
| 75-01-4 | Vinyl chloride | Ethene, chloro- |
| 75-02-5 | Ethene, fluoro- | Vinyl fluoride |
| 75-09-2 | Dichloromethane | Methylene chloride |
| 75-25-2 | Bromoform | Tribromomethane |
| 75-27-4 | Dichlorobromomethane | |
| 75-34-3 | Ethylidene Dichloride | 1,1-Dichloroethane |
| 75-35-4 | Vinylidene chloride | 1,1-Dichloroethylene, Ethene, 1,1-dichloro- |
| 75-43-4 | Dichlorofluoromethane | |

| CAS # | Name | Synonym |
|----------|--------------------------------|---|
| 75-45-6 | Chlorodifluoromethane | HCFC-22; R-22 |
| 75-63-8 | Bromotrifluoromethane | Halon 1301 |
| 75-68-3 | 1-Chloro-1,1-difluoroethane | HCFC-142b |
| 75-69-4 | Trichlorofluoromethane | |
| 75-71-8 | Dichlorodifluoromethane | CFC-12; R-12; Halon 122, Carbon dichloride difluoride; Freon 12; P-12 |
| 75-72-9 | Chlorotrifluoromethane | CFC-13 |
| 75-88-7 | 1-Chloro-2,2,2-Trifluoroethane | HCFC-133a |
| 76-01-7 | Pentachloroethane | Ethane pentachloride |
| 76-13-1 | Freon 113 | 1,1,2-Trichloro-1,2,2-trifluoroethane; Ethane, 1,1,2-trichloro-1,2,2,-trifluoro |
| 76-14-2 | Dichlorotetrafluoroethane | CFC-114 |
| 76-15-3 | Monochloropentafluoroethane | CFC-115 |
| 78-87-5 | 1,2-Dichloropropane | Propane 1,2-dichloro- |
| 78-88-6 | 2,3-Dichloropropene | 2-Chloroallyl chloride |
| 78-99-9 | 1,1-Dichloropropane | Propylidene chloride |
| 79-00-5 | 1,1,2-Trichloroethane | Vinyl trichloride |
| 79-01-6 | Trichloroethylene | 1,2,2-Trichloroethylene |
| 79-34-5 | 1,1,2,2-Tetrachloroethane | Acetylene tetrachloride |
| 87-68-3 | Hexachloro-1,3-butadiene | Hexachlorobutadiene |
| 96-12-8 | 1,2-Dibromo-3-chloropropane | DBCP |
| 96-18-4 | 1,2,3-Trichloropropane | Trichlorohydrin |
| 106-93-4 | 1,2-Dibromoethane | Ethylene dibromide |
| 106-94-5 | n-propyl bromide | 1-bromopropane |
| 107-05-1 | Allyl chloride | 1-Chloroprop-2-ene |
| 107-06-2 | 1,2-Dichloroethane | Ethylene dichloride |
| 110-57-6 | trans-1,4-Dichloro-2-butene | trans-1,4-Dichlorobutene |

| CAS # | Name | Synonym |
|----------|---|---|
| 116-14-3 | Ethene, tetrafluoro- | Tetrafluoroethylene |
| 124-48-1 | Chlorodibromomethane | Monochlorodibromomethane |
| 124-73-2 | Dibromotetrafluoroethane | Halon 2402 |
| 126-99-8 | Chloroprene | 2-CHLOR-1,3-BUTADIENE |
| 127-18-4 | Tetrachloroethylene | Perchloroethylene |
| 142-28-9 | 1,3-Dichloropropane | Trimethylene dichloride |
| 156-60-5 | trans-1,2-Dichloroethylene | trans-Acetylene dichloride |
| 306-83-2 | 2,2-Dichloro-1,1,1-trifluoroethane | HCFC-123 |
| 353-59-3 | Bromochlorodifluoromethane | Halon 1211 |
| 354-11-0 | 1,1,1,2-Tetrachloro-2-fluoroethane | HCFC-121a |
| 354-14-3 | 1,1,2,2-Tetrachloro-1-fluoroethane | HCFC-121 |
| 354-23-4 | 1,2-Dichloro-1,1,2-trifluoroethane | HCFC-123a |
| 354-25-6 | 1-Chloro-1,1,2,2-tetrafluoroethane | HCFC-124a |
| 422-44-6 | 1,2-Dichloro-1,1,2,3,3-pentafluoropropane | HCFC-225bb |
| 422-48-0 | 2,3-Dichloro-1,1,1,2,3-pentafluoropropane | HCFC-225ba |
| 422-56-0 | 3,3-Dichloro-1,1,1,2,2-pentafluoropropane | HCFC-225ca |
| 431-86-7 | 1,2-Dichloro-1,1,3,3,3-pentafluoropropane | HCFC-225da |
| 460-35-5 | 3-Chloro-1,1,1-trifluoropropane | HCFC-253fb |
| 507-55-1 | 1,3-Dichloro-1,1,2,2,3-pentafluoropropane | HCFC-225cb |
| 540-59-0 | 1,2-Dichloroethylene | mixed cis- and trans- isomers of 1,2-dichloroethylene |
| 542-75-6 | 1,3-Dichloropropylene | 1,3-Dichloropropene |
| 563-47-3 | 3-Chloro-2-methyl-1-propene | Isobutenyl chloride |
| 593-60-2 | Ethene, bromo- | Vinyl bromide |
| 630-20-6 | 1,1,1,2-Tetrachloroethane | Ethane, 1,1,1,2-tetrachloro- |
| 764-41-0 | 1,4-Dichloro-2-butene | 2-Butene, 1,4-dichloro- |

| CAS # | Name | Synonym |
|-------------|--|---|
| 812-04-4 | 1,1-Dichloro-1,2,2-trifluoroethane | HCFC-123b |
| 1649-08-7 | 1,2-Dichloro-1,1-difluoroethane | HCFC-132b |
| 1717-00-6 | 1,1-Dichloro-1-fluoroethane | HCFC-141b |
| 1888-71-7 | Hexachloropropene | Perchloropropene |
| 2837-89-0 | 2-Chloro-1,1,1,2-tetrafluoroethane | HCFC-124 |
| 2837-89-0 | 2-Chloro-1,1,1,2-tetrafluoroethane | |
| 8003-19-8 | Dichloropropane - Dichloropropene (mixture) | Nemafene |
| 10061-02-6 | trans-1,3-Dichloropropene | trans-3-Chloroallyl chloride |
| 13474-88-9 | 1,1-Dichloro-1,2,2,3,3-pentafluoropropane | HCFC-225cc |
| 26638-19-7 | Dichloropropane | Propane dichloride |
| 26952-23-8 | Dichloropropene | Dichloropropylene |
| 34077-87-7 | Dichlorotrifluoroethane | HCFC 123; R-123 2,2-Dichloro-1,1,1-Trifluoroethane |
| 63938-10-3 | Chlorotetrafluoroethane, mixed isomers | |
| 90454-18-5 | Dichloro-1,1,2-trifluoroethane mixed isomers | HCFC-123 |
| 111512-56-2 | 1,1-Dichloro-1,2,3,3,3-pentafluoropropane | HCFC-225eb |
| 127564-92-5 | Dichloropentafluoropropane | n/f |
| 128903-21-9 | HCFC-225aa | 2,2-Dichloro-1,1,1,3,3-Pentafluoropropane |
| 136013-79-1 | 1,3-Dichloro-1,1,2,3,3-pentafluoropropane | HCFC-225ea |

Substances in the C1-C4 Halogenated Compounds NOL Category, that have been reported to be in commerce (through the TSCA CDR)

| CAS | Chemical Name | Synonym |
|---------|-----------------------|-------------------------|
| 74-96-4 | Bromoethane | Ethyl bromide |
| 74-97-5 | Methane, bromochloro- | Chlorobromomethane |
| 75-03-6 | Iodoethane | Ethyl iodide |
| 75-10-5 | Methane, difluoro- | Difluoromethane; HFC-32 |

| CAS | Chemical Name | Synonym |
|----------|---|---|
| 75-26-3 | 2-bromopropane | Isopropyl bromide |
| 75-37-6 | 1,1-Difluoroethane | HFC-152a; Difluoroethane Ethylidene difluoride Ethylidene fluoride R-152a; DFE |
| 75-38-7 | 1,1-Difluoroethene | Vinylidene difluoride |
| 75-46-7 | Methane, trifluoro- | Trifluoromethane fluoroform; Freon 23; Genetron 23 HFC-23; R 23 |
| 75-73-0 | Carbon tetrafluoride | Perfluoromethane |
| 76-16-4 | Ethane, hexafluoro- | Perfluoroethane |
| 76-19-7 | Octafluoropropane | perfluoropropane, R 218, Flutec PP30, genetron 218, Freon 218, PFC 218 |
| 79-38-9 | Chlorotrifluoroethylene | CTFE |
| 106-95-6 | Allyl bromide | 2-Propenyl bromide 1-Propene, 3-bromo- |
| 107-04-0 | Ethane, 1-bromo-2-chloro- | 1-Bromo-2-chloroethane |
| 109-65-9 | Butane, 1-bromo- | 1-bromobutanen butyl bromide |
| 109-70-6 | Propane, 1-bromo-3-chloro- | 1-Bromo-3-chloropropane |
| 115-25-3 | Octafluorocyclobutane (Perfluorocyclobutane) | Freon C 318 |
| 116-15-4 | 1,1,2,3,3,3-Hexafluoro-1-propene | Perfluoropropene; Hexafluoropropylene |
| 354-33-6 | Pentafluoroethane | HFC-125 1,1,1,2,2-Pentafluoroethane; R-125 |
| 354-58-5 | 1,1,1-Trichlorotrifluoroethane | CFC 113a |
| 354-64-3 | Pentafluoroethyl iodide | Pentafluoroiodoethane Ethane, 1,1,1,2,2- pentafluoro-2-iodo- |
| 359-07-9 | Ethane, 2-bromo-1,1-difluoro- | |
| 359-35-3 | 1,1,2,2-tetrafluoroethane | HFC-134 |
| 374-07-2 | 1,1-Dichlorotetrafluoroethane | R-114, cryofluorane |
| 382-10-5 | 1-Propene, 3,3,3-trifluoro-2- (trifluoromethyl)- | Hexafluoroisobutene; 3,3,3,4,4,4-Hexafluoroisobutyl ene |
| 406-58-6 | 1,1,1,3,3-Pentafluorobutane | |

| CAS | Chemical Name | Synonym |
|-------------|----------------------------------|--|
| 420-46-2 | 1,1,1-Trifluoroethane | HFC-143a; R-143a; HFA-143a; Ethane, trifluoro-; Methylfluoroform |
| 420-46-2 | 1,1,1-Trifluoroethane | MethylfluoroformR-143a |
| 423-39-2 | Perfluorobutyl iodide | Nonafluoro-1-iodobutane1,1,1,2,2,3,3,4,4- Nonafluoro-4-iodobutane |
| 431-31-2 | 1,1,1,2,3-Pentafluoropropane | |
| 431-89-0 | 1,1,1,2,3,3,3-Heptafluoropropane | HFC-227ea |
| 460-73-1 | 1,1,1,3,3-Pentafluoropropane | HFC-245fa |
| 507-20-0 | 2-chloro-2-methylpropane | tert-butyl chloride |
| 557-91-5 | 1,1-Dibromoethane | Ethylidene dibromide |
| 677-21-4 | 1-Propene, 3,3,3-trifluoro- | 3,3,3-Trifluoropropene |
| 690-39-1 | 1,1,1,3,3,3-Hexafluoropropane | HFC-236fa |
| 754-12-1 | 2,3,3,3-Tetrafluoropropene | HFO-1234yf |
| 811-97-2 | 1,1,1,2-Tetrafluoroethane | HFC-134a; HFA-134a R-134a Norflurane |
| 5408-86-6 | Butane, 2,3-dibromo- | 2,3-Dibromobutane, mixture of (±) and meso |
| 29118-24-9 | 1,3,3,3-Tetrafluoropropene | HFO-1234ze(E) |
| 102687-65-0 | 1-Chloro-3,3,3-trifluoropropene | HFO-1233zd (E)Hydro-fluoro-olefin (HFO)R-1233zd |

Other C1-C4 Halogenated Compounds. These are not known to be in commerce. This list is not exhaustive.

| CAS | Chemical Name | Synonym |
|---------|---|------------------------|
| 75-11-6 | Methane, diiodo- | Methylene iodide |
| 75-47-8 | Methane, triiodo- | Iodoform |
| 75-61-6 | Dibromodifluoromethane | Difluorodibromomethane |
| 75-82-1 | 1,2-Dibromo-1,1-difluoroethane | |
| 76-11-9 | 1,1,1,2-Tetrachloro-2,2-difluoroethane | |
| 76-12-0 | 1,1,2,2-Tetrachloro-1,2-difluoroethane | |
| 76-18-6 | 2-Chloro-1,1,1,2,3,3,3-heptafluoropropane | |

| CAS | Chemical Name | Synonym |
|----------|---|--|
| 78-74-0 | Ethane, 1,1,2-tribromo- | |
| 78-75-1 | 1,2-Dibromopropane | Propylene dibromide |
| 79-27-6 | 1,1,2,2-Tetrabromoethane | Acetylene tetrabromide |
| 79-28-7 | Ethene, tetrabromo- | Ethene, 1,1,2,2-tetrabromo-; Tetrabromoethene; tetrabromoethylene; |
| 79-35-6 | 1,1-Dichloro-2,2-difluoroethylene | |
| 96-11-7 | 1,2,3-Tribromopropane | Glycerol tribromohydrin |
| 109-64-8 | 1,3-Dibromopropane | Trimethylene dibromide |
| 124-72-1 | Teflurane | |
| 156-59-2 | cis-1,2-Dichloroethylene | |
| 338-75-0 | 2,3-Dichloro-1,1,1-trifluoropropane | |
| 353-36-6 | Ethane, fluoro- | Monofluoroethane |
| 353-54-8 | Methane, tribromofluoro- | |
| 353-83-3 | 1,1,1-Trifluoro-2-iodoethane | |
| 354-04-1 | Ethane, 1,2-dibromo-1,1,2-trifluoro- | |
| 354-12-1 | 1,1,1-Trichloro-2,2-difluoroethane | |
| 354-15-4 | 1,1,2-Trichloro-1,2-difluoroethane | |
| 354-21-2 | 1,1,2-Trichloro-2,2-difluoroethane | |
| 354-48-3 | 1,1,1-Tribromo-2,2,2-trifluoroethane | |
| 354-55-2 | Bromopentafluoroethane | |
| 354-56-3 | Pentachlorofluoroethane | |
| 354-92-7 | Propane, 1,1,1,2,3,3,3-heptafluoro-2-(trifluoromethyl)- | |
| 355-20-4 | Butane, 2,3-dichloro-1,1,1,2,3,4,4,4-octafluoro- | |
| 355-24-8 | Butane, 1,4-dichloro-1,1,2,2,3,3,4,4-octafluoro- | |
| 355-25-9 | Decafluorobutane (Perfluorobutane) | |

| CAS | Chemical Name | Synonym |
|----------|--|---|
| 356-18-3 | Dichlorohexafluorocyclo Butane | |
| 358-97-4 | 1,2-Dibromo-1-fluoroethane | |
| 359-11-5 | Ethene, trifluoro- | Trifluoroethylene |
| 359-28-4 | 1,1,2-Trichloro-2-fluoroethane | |
| 359-58-0 | 1-Chloro-1,1,2,3,3,3-hexafluoropropane | |
| 360-86-1 | 2-Butene, 1,3-dichloro-1,1,2,4,4,4-hexafluoro- | |
| 360-88-3 | 2-Butene, 1,4-dichloro-1,1,2,3,4,4-hexafluoro- | |
| 360-89-4 | 2-Butene, 1,1,1,2,3,4,4,4-octafluoro- | |
| 375-17-7 | 1,1,1,2,2,3,3,4,4-Nonafluorobutane | |
| 375-50-8 | Butane, 1,1,2,2,3,3,4,4-octafluoro-1,4-diiodo- | |
| 377-36-6 | Butane, 1,1,2,2,3,3,4,4-octafluoro- | |
| 377-41-3 | Chloroheptafluorocyclobutane | |
| 382-21-8 | Perfluoroisobutylene | 1-Propene, 1,1,3,3,3-pentafluoro-2-(trifluoromethyl)- |
| 407-81-8 | 2-Butene, 1,4-difluoro- | 1,4-Difluoro-2-butene |
| 420-44-0 | 2-Chloro-2-fluoropropane | |
| 420-45-1 | Propane, 2,2-difluoro- | Dimethyldifluoromethane |
| 420-99-5 | 1-Chloro-2,2-difluoropropane | |
| 421-04-5 | 1-Chloro-1,1,2-Trifluoroethane | |
| 421-07-8 | Propane, 1,1,1-trifluoro- | |
| 421-73-8 | 2-Chloro-1,1,1,2-tetrafluoropropane | |
| 421-75-0 | 1-Chloro-1,1,2,2-tetrafluoropropane | |
| 421-99-8 | 1,1,3-Trichloro-1,2,2-trifluoropropane | |
| 422-00-5 | 1,3-Dichloro-1,1,2,2-tetrafluoropropane | |

| CAS | Chemical Name | Synonym |
|----------|--|----------------------|
| 422-02-6 | 3-Chloro-1,1,1,2,3-pentafluoropropane | |
| 422-26-4 | 1,1,1,2,2,3-Hexachloro-3-fluoropropane | |
| 422-49-1 | 1,1,1,3,3-Pentachloro-2,2-difluoropropane | |
| 422-50-4 | 1,1,1,3-Tetrachloro-2,2,3-trifluoropropane | |
| 422-51-5 | 1,1,1-Trichloro-2,2,3,3-tetrafluoropropane | |
| 422-52-6 | 1,1,3,3-Tetrachloro-1,2,2-trifluoropropane | |
| 422-53-7 | 1,1,3-Trichloro-1,2,2,3-tetrafluoropropane | |
| 422-54-8 | 1,3,3-Trichloro-1,1,2,2-tetrafluoropropane | |
| 422-55-9 | 1-Chloro-1,1,2,2,3,3-hexafluoropropane | |
| 422-57-1 | 3-Chloro-1,1,1,2,2,3-hexafluoropropane | |
| 422-78-6 | 1,1,1,2,2,3,3-Heptachloro-3-fluoropropane | |
| 422-86-6 | 1-Chloro-1,1,2,2,3,3,3-heptafluoropropane | |
| 425-94-5 | 1,2-Dichloro-1,2,3,3-tetrafluoropropane | |
| 430-53-5 | 1,1-Dichloro-2-fluoroethane | |
| 430-57-9 | 1,2-Dichloro-1-fluoroethane | |
| 430-66-0 | Ethane, 1,1,2-trifluoro- | FC 143 |
| 431-07-2 | 1-Chloro-1,2,2-Trifluoroethane | |
| 431-63-0 | 1,1,1,2,3,3-Hexafluoropropane | |
| 431-87-8 | 2-Chloro-1,1,1,3,3,3-hexafluoropropane | |
| 462-39-5 | Propane, 1,3-difluoro- | 1,3-Difluoropropane |
| 471-43-2 | 1,1-Dichloro-2,2-difluoroethane | |
| 507-25-5 | Methane, tetraiodo- | Carbon tetraiodide |
| 513-31-5 | 2,3-Dibromopropene | 2-Bromoallyl bromide |
| 513-92-8 | Ethene, tetraiodo- | Tetraiodoethylene |

| CAS | Chemical Name | Synonym |
|----------|--|-----------------------|
| 540-49-8 | 1,2-Dibromoethylene | 2-Bromovinyl bromide |
| 540-54-5 | 1-Chloropropane | |
| 556-56-9 | Allyl iodide | 3-Iodopropylene |
| 558-13-4 | Tetrabromomethane | Carbon tetrabromide |
| 590-11-4 | cis-Dibromoethylene | |
| 590-12-5 | trans-1,2-Dibromoethylene | |
| 593-53-3 | Methyl fluoride | Fluoromethane |
| 593-66-8 | Ethene, iodo- | Iodoethylene |
| 593-70-4 | Chlorofluoromethane | |
| 593-92-0 | 1,1-Dibromoethylene | Vinylidene bromide |
| 594-02-5 | 1,1-Diiodoethane | |
| 594-16-1 | Propane, 2,2-dibromo- | |
| 594-37-6 | 1,2-dichloro-2-methylpropane | |
| 594-73-0 | Hexabromoethane | |
| 598-16-3 | Ethylene tribromide | Tribromoethene |
| 598-29-8 | 1,2-Diiodopropane | |
| 624-72-6 | <i>1,2-Difluoroethane (HFC-152)</i> | Ethylene difluoride |
| 624-73-7 | <i>Ethane, 1,2-diiodo-</i> | |
| 627-31-6 | Propane, 1,3-diiodo- | Trimethylene diiodide |
| 630-16-0 | Ethane, 1,1,1,2-tetrabromo- | |
| 661-95-0 | Propane, 1,2-dibromo-1,1,2,3,3,3-hexafluoro- | |
| 661-97-2 | 1,2-Dichloro-1,1,2,3,3,3-hexafluoropropane | |
| 662-00-0 | 1,1,1,2,2,3,3-Heptafluorobutane | |
| 662-01-1 | 1,3-Dichloro-1,1,2,2,3,3-hexafluoropropane | |

| CAS | Chemical Name | Synonym |
|-----------|--|----------------------------|
| 677-54-3 | 1,1,1,3-Tetrachloro-2,2-difluoropropane | |
| 677-55-4 | 1-Chloro-1,1,3,3,3-pentafluoropropane | |
| 677-56-5 | 1,1,1,2,2,3-Hexafluoropropane | |
| 679-85-6 | 3-Chloro-1,1,2,2-tetrafluoropropane | |
| 679-86-7 | 1,1,2,2,3-Pentafluoropropane | |
| 679-99-2 | 1-Chloro-1,1,2,2,3-pentafluoropropane | |
| 685-63-2 | <i>1,3-Butadiene, 1,1,2,3,4,4-hexafluoro-</i> | Hexafluoro-1,3-butadiene |
| 697-11-0 | Cyclobutene, hexafluoro- | |
| 811-95-0 | 1,1,2-Trichloro-1-fluoroethane | |
| 821-06-7 | 2-Butene, 1,4-dibromo-, (2E)- | trans-1,4-Dibromobut-2-ene |
| 1112-01-2 | 1,1-Dichloro-2,2-difluoropropane | |
| 1112-14-7 | 1,1,3,3-Tetrachloro-2,2-difluoropropane | |
| 1112-36-3 | 1,3-Dichloro-2,2-difluoropropane | |
| 1511-62-2 | Bromodifluoromethane | |
| 1516-64-9 | 2-Butene, 1,1,1,2,3,4,4,4-octafluoro-, (E)- | |
| 1542-18-3 | Propane, 2-(difluoroiodomethyl)- 1,1,1,2,3,3,3-heptafluoro- | |
| 1615-75-4 | 1-Chloro-1-fluoroethane | |
| 1645-83-6 | 1,3,3,3-Tetrafluoropropene | |
| 1691-13-0 | 1,2-Fluoroethene | |
| 1814-88-6 | Pentafluoropropane | |
| 1842-05-3 | 1,1-Dichloro-1,2-difluoroethane | |
| 1868-53-7 | Methane, dibromofluoro- | Dibromofluoromethane |
| 2252-84-8 | 1,1,2,2,3,3,3-Heptafluoropropane | |
| 2268-46-4 | 1,2,2,3-Tetrachloro-1,1,3,3-tetrafluoropropane | |
| 2311-14-0 | 1,1,1-Tribromoethane | |

| CAS | Chemical Name | Synonym |
|------------|---|---------------------------------------|
| 2354-06-5 | 1,1,1,3,3-Pentachloro-2,2,3-trifluoropropane | |
| 2366-36-1 | 1,1,1-Trichloro-2-fluoroethane | |
| 2730-43-0 | 1-Chloro-3,3,3-trifluoropropene | |
| 2730-64-5 | 1-Chloro-1,1,3,3-tetrafluoropropane | |
| 3017-69-4 | 1-Propene, 1-bromo-2-methyl- (9CI) | |
| 3470-67-5 | Ethane, 1,1,1,2-tetrabromo-2,2-difluoro- | 1,1,1,2-Tetrabromo-2,2-difluoroethane |
| 4071-01-6 | 1,1-Dichloro-2,2,3,3-tetrafluoropropane | |
| 4259-43-2 | 1,1,1-Trichloro-2,2,3,3,3-pentafluoropropane | |
| 4399-47-7 | Bromocyclobutane | |
| 4459-18-1 | Propane, 1,1,1,3,3,3-hexafluoro-2-iodo-2-(trifluoromethyl)- | |
| 4784-77-4 | 2-Butene, 1-bromo- | |
| 5162-44-7 | 1-Butene, 4-bromo- | |
| 6974-12-5 | 2-Butene, 1,4-dibromo- | 1,4-Dibromo-2-butene |
| 7051-34-5 | Bromomethylcyclopropane | |
| 7125-99-7 | 1,1-Dichloro-1,2,2-trifluoropropane | |
| 11070-66-9 | Butene, octafluoro- | |
| 13195-80-7 | 1-Propene, 1,1-dibromo- | |
| 17705-30-5 | 2,2-Dichloro-1,1,3,3-tetrafluoropropane | |
| 18599-22-9 | 1-Butene, 4-bromo-3,3,4-tetrafluoro- | |
| 19041-02-2 | 2-Chloro-1,1,3,3-tetrafluoropropane | |
| 19398-48-2 | 2-Butene, 2,3-dibromo- | |
| 20972-44-5 | 2-Butene, 1,4-dichloro-1,1,2,3,4,4-hexafluoro-, (2E)- | |
| 24270-66-4 | 1,1,2,3,3-Pentafluoropropane | |

| CAS | Chemical Name | Synonym |
|------------|---|------------|
| 25167-20-8 | Tetrabromoethane | |
| 25429-23-6 | Ethene, dibromo- | |
| 25497-29-4 | Chlorodifluoroethane | |
| 25497-29-4 | 1-Chloro-1,2-difluoroethane | |
| 25915-78-0 | Dichlorodifluoroethane | |
| 26391-16-2 | 1-Propene, 1,2-dibromo- | |
| 27072-47-5 | Dibromopropane | |
| 27336-23-8 | 1,1-Dibromo-1,2,2,2-tetrafluoroethane | |
| 28103-66-4 | 1-Chloro-1,2,2,3,3-pentafluoropropane | |
| 28984-80-7 | Butane, trichloroheptafluoro- | |
| 30283-90-0 | Ethane, bromotetrafluoro- | |
| 31392-96-8 | Ethane, dibromodifluoro- | |
| 40723-63-5 | 1,1,2,2-Tetrafluoropropane | |
| 40723-80-6 | Butane, 1,1,1,2,2-pentafluoro-4-iodo- | |
| 51346-64-6 | 2-Chloro-1,1,1,2,3,3-hexafluoropropane | |
| 56758-54-4 | 1-Chloro-2,2,3-trifluoropropane | |
| 64712-27-2 | 1,1-Dichloro-1,3,3,3-tetrafluoropropane | |
| 67406-66-0 | 1-Chloro-1,2,2,3-tetrafluoropropane | |
| 67406-68-2 | 1,3-Dichloro-1,2,2-trifluoropropane | |
| 70192-63-1 | 1,1-Dichloro-1,2,2,3-tetrafluoropropane | |
| 70192-70-0 | 1,1-Dichloro-2,2,3-trifluoropropane | |
| 70192-76-6 | 1-Chloro-1,2,2-trifluoropropane | |
| 70341-81-0 | 1,3-Dichloro-1,2,2,3-tetrafluoropropane | |
| 72101-30-5 | Propane, bromotrifluoro- | B059590000 |
| 75995-72-1 | 1,1,1,2,3,4,4,4-Octafluorobutane | |
| 76140-39-1 | 1,3-Dichloro-1,1,3,3-tetrafluoropropane | |

| CAS | Chemical Name | Synonym |
|-------------|--|---------|
| 76546-99-3 | Hexachlorodifluoropropane | |
| 110587-14-9 | Chlorofluoroethane | |
| 117970-90-8 | 2-Chloro-1,1,1,3-tetrafluoropropane | |
| 127564-83-4 | Dichlorotetrafluoropropane | |
| 131211-71-7 | 1,1,1-Trichloro-2,2,3-trifluoropropane | |
| 131221-36-8 | 1,1,3-Trichloro-2,2,3-trifluoropropane | |
| 134190-48-0 | Pentachlorofluoropropane | |
| 134190-49-1 | Tetrachlorofluoropropane | |
| 134190-50-4 | Chlorotetrafluoropropane | |
| 134190-51-5 | Trichlorofluoropropane | |
| 134190-52-6 | Dichlorodifluoropropane | |
| 134190-53-7 | Chlorodifluoropropane | |
| 134190-54-8 | Chlorofluoropropane | |
| 134237-36-8 | Pentachlorodifluoro Propane | |
| 134237-37-9 | Tetrachlorotrifluoro Propane | |
| 134237-38-0 | Trichlorotetrafluoro Propane | |
| 134237-39-1 | Tetrachlorodifluoropropane | |
| 134237-40-4 | Trichlorotrifluoropropane | |
| 134237-41-5 | Chloropentafluoropropane | |
| 134237-42-6 | Trichlorodifluoropropane | |
| 134237-43-7 | Dichlorotrifluoropropane | |
| 134237-44-8 | Chlorotrifluoropropane | |
| 134237-45-9 | Dichlorofluoropropane | |

| CAS | Chemical Name | Synonym |
|-------------|---|------------|
| 134251-06-2 | 2-Chloro-1,1,1,3,3-pentafluoropropane | |
| 134308-72-8 | Chlorohexafluoropropane | |
| 146916-90-7 | 2,3-Dichloro-1,1,1,3-tetrafluoropropane | |
| 149329-24-8 | 2,2-Dichloro-1,1,1,3-tetrafluoropropane | |
| 149329-25-9 | 2,3-Dichloro-1,1,1,2-tetrafluoropropane | |
| 149329-26-0 | 1,2-Dichloro-1,1,2,3-tetrafluoropropane | |
| 149329-27-1 | 1,3-Dichloro-1,1,2-trifluoropropane | |
| 151771-08-3 | 1,3-Dichloro-1,2,3-trifluoropropane | |
| n/f | Propane, dibromopentafluoro- | D01820000 |
| n/f | Fluorotetrabromoethane | F034300000 |

Guidance for Reporting Per- and Poly-Fluoroalkyl Substances (PFAS) under the Toxics Use Reduction Act (TURA), including Individually Listed PFAS and the Certain PFAS Not Otherwise Listed (NOL) Category

Per- and Poly-Fluoroalkyl Substances (PFAS) are a very large group of chemicals, currently totaling over 10,000, with continually evolving regulatory requirements. Continuing updates to the Toxics Release Inventory (TRI) under the 2020 National Defense Authorization Act (NDAA) affect TURA reporting requirements. Some PFAS are reportable individually, and some are reportable under either the TURA C1 - C4 Halogenated Hydrocarbons NOL category, or the TURA Certain PFAS NOL category, or both:

- PFAS are reportable individually under TURA when (a) they are individually listed under TRI (Table 1) and (b) if they were already reportable under TURA (Table 2).
- PFAS are reportable as part of a category as part of (a) the C1-C4 NOL category (Table 3), and (b) the new Certain PFAS NOL category (Table 4).

For the 2021 Reporting Year, 172 Individual PFAS were added to the TURA list, after being added to TRI. These individually added PFAS have a reporting threshold of 100 lbs. each and are listed in [Table 1](#) below. **Note that EPA is CONTINUALLY ADDING to this list, including ten already identified PFAS, listed toward the end of [Table 4](#), in gray.** Nine PFAS in gray at the end of Table 4 have been added to TURA individually for reporting year **2026**. They **should be reported as part of the TURA Certain PFAS NOL category for reporting year 2025**. (One PFAS added to TRI on 1/1/2026 has not yet been voted on by the TURA Administrative Council.)

For the 2022 Reporting Year, the Certain PFAS NOL category was added under TURA. The Certain PFAS NOL category is defined as those PFAS that contain:

- a perfluoroalkyl moiety⁵ with three or more carbons (e.g., $-\text{C}_n\text{F}_{2n}-$, $n \geq 3$; or $\text{CF}_3-\text{C}_n\text{F}_{2n}-$, $n \geq 2$)
- a perfluoroalkylether moiety with two or more carbons (e.g., $-\text{C}_n\text{F}_{2n}\text{OC}_m\text{F}_{2m}-$ or $-\text{C}_n\text{F}_{2n}\text{OC}_m\text{F}_m-$, n and $m \geq 1$)

wherein for the example structures shown, the dash (–) is not a bond to a hydrogen and may represent a straight or branched structure, and that are not otherwise listed.

Reporting of this Certain PFAS NOL category is at typical TURA thresholds of 25,000 pounds manufactured or processed and 10,000 pounds otherwise used annually. There is a large group of PFAS that meet this definition.

All chemicals meeting the above Certain PFAS NOL definition are reportable as part of the category unless they are individually listed under TURA. The lists of PFAS with CAS registry numbers in this document are provided to assist filers but are not exhaustive.

⁵ “In organic chemistry, a **moiety** is a part of a molecule that is given a name because it is identified as a part of other molecules as well.” Source: Moiety (chemistry) - Wikipedia

[Table 1](#) below lists PFAS that are individually reportable under TURA at the 100 lbs. threshold, after TURA adopted the TRI NDAA listings. Note the de minimis exemption was removed for these in reporting year 2024.

[Table 2](#) below lists PFAS that were already individually reportable under TURA. Continue to report them at typical reporting thresholds.

[Table 3](#) lists PFAS that are reportable under the TURA C1-C4 Halogenated Hydrocarbons category. The substances shaded in gray at the bottom are **ALSO** reportable under the new Certain PFAS NOL TURA category. Report **BOTH** C1-C4 Halogenated Hydrocarbons **AND** Certain PFAS NOL for the substances in gray. Only one fee will be due.

[Table 4](#) lists PFAS that are reportable under the Certain PFAS NOL category only. Substances in gray have recently been added by TRI at a 100 lb/year threshold. Report under TURA as part of Certain PFAS NOL at the 25,000/10,000lb threshold for reporting year 2025.

The lists in Tables 2-4 were generated from PFAS that are known to be in commerce, primarily from the Toxic Substances Control Act (TSCA). Thus, these lists are **NOT** exhaustive. Approximately 1/3 of the PFAS in commerce, as noted by the TSCA Chemical Data Reporting (CDR), are claimed as Confidential Business Information (CBI) and thus will require the supplier to disclose whether the substance meets the definition.

PFAS are often on SDSs without CAS numbers or a full chemical name (i.e., they may be identified as ‘fluoropolymer’ or some more general language). For that reason, it is important to contact suppliers to find out whether PFAS are in the products used. OTA has developed [a supplier notification letter template](#) for this purpose.

Note that some PFAS are in products at concentrations below the de minimis⁶ exemption amount (1% for most PFAS, 0.1% for PFOA as a carcinogen). EPA removed the de minimis exemption in reporting year 2024 for PFAS that are individually listed on TRI (Table 1). Quantities below the de minimis do not need to be counted for the remaining PFAS (Tables 2,3 and 4) when determining if the reporting threshold has been met.

For fluorinated substances where a chemical structure is not available it should be assumed to be part of the Certain PFAS NOL category until more specific information is available.

⁶ In determining the amount or quantity of a toxic substance manufactured, processed, or otherwise used at a facility, the toxics user shall not consider the amount of the toxic substance if it is present in a mixture in concentrations equal to or below the de minimis concentration for that toxic substance set forth in 40 CFR Part 372.38(a); provided, however, that this de minimis exemption shall not apply for any toxic or hazardous substance specified as a chemical of special concern in 40 CFR Part 372.28.

Normal article exemptions⁷ apply for PFAS. For example, PTFE pellets being processed, such as in extrusion processes, would be reportable, as would PTFE coating emulsions. Teflon articles, such as Teflon tape or spacers, would likely meet the article exemption.

Table 1. TURA/TRI PFAS Substances to Continue Reporting Individually, if more than 100 lbs./year used

| CAS | Chemical Name |
|----------|--|
| 307-24-4 | Perfluorohexanoic acid (PFHxA) (reportable under TRI as of 1/1/24) |
| 307-35-7 | Perfluorooctylsulfonyl fluoride |
| 307-55-1 | Perfluorododecanoic acid |
| 335-66-0 | Octanoyl fluoride, pentadecafluoro- |
| 335-67-1 | Perfluorooctanoic acid |
| 335-71-7 | 1-Heptanesulfonyl fluoride, 1,1,2,2,3,3,4,4,5,5,6,6,7,7,7-pentadecafluoro- |
| 335-76-2 | Perfluorodecanoic acid |
| 335-93-3 | Silver(I) perfluorooctanoate (reportable under TRI as of 1/1/21) |
| 335-95-5 | Sodium perfluorooctanoate |
| 355-46-4 | Perfluorohexanesulfonic acid |
| 375-22-4 | PFBA (reportable under TRI as of 1/1/23) |
| 375-73-5 | Perfluorobutane sulfonic acid (PFBS) (reportable under TRI as of 1/1/22) |
| 375-95-1 | Perfluorononanoic acid |
| 376-06-7 | Perfluorotetradecanoic acid |
| 376-14-7 | 2-[Ethyl[(heptadecafluorooctyl)sulfonyl]amino]ethyl methacrylate |
| 376-27-2 | Methyl perfluorooctanoate |

⁷ Article means a manufactured item, other than an item which is manufactured at the facility: (a) which is formed to a specific shape or design during manufacture; (b) which has end use functions dependent in whole or in part upon its shape or design during end use; and (c) which does not release a toxic substance under normal conditions of processing or use of that item at the facility or establishments. See 40 CFR Part 372.38(b) for detailed information.

| CAS | Chemical Name |
|-----------|---|
| 383-07-3 | 2-[Butyl[(heptadecafluorooctyl)sulfonyl]amino]ethyl acrylate |
| 422-64-0 | Perfluoropropanoic acid (PFPrA) (reportable under TRI as of 1/1/24) |
| 423-82-5 | 2-[Ethyl[(heptadecafluorooctyl)sulfonyl]amino]ethyl acrylate |
| 507-63-1 | Perfluorooctyl iodide (reportable under TRI as of 1/1/21) |
| 678-39-7 | 1-Decanol, 3,3,4,4,5,5,6,6,7,7,8,8,9,9,10,10,10-heptadecafluoro- |
| 865-86-1 | 1-Dodecanol, 3,3,4,4,5,5,6,6,7,7,8,8,9,9,10,10,11,11,12,12,12-heneicosafuoro- |
| 1652-63-7 | 3-[[Heptadecafluorooctyl)sulfonyl]amino]-N,N,N-trimethyl-1-propanaminium iodide |
| 1691-99-2 | N-Ethyl-N-(2-hydroxyethyl)perfluorooctanesulfonamide |
| 1763-23-1 | Perfluorooctane sulfonic acid |
| 1996-88-9 | 2-Propenoic acid, 2-methyl-, 3,3,4,4,5,5,6,6,7,7,8,8,9,9,10,10,10-heptadecafluorodecyl ester |
| 2043-53-0 | Decane, 1,1,1,2,2,3,3,4,4,5,5,6,6,7,7,8,8-heptadecafluoro-10-iodo- |
| 2043-54-1 | Dodecane, 1,1,1,2,2,3,3,4,4,5,5,6,6,7,7,8,8,9,9,10,10-heneicosafuoro-12-iodo- |
| 2144-54-9 | 2-Propenoic acid, 2-methyl-, 3,3,4,4,5,5,6,6,7,7,8,8,9,9,10,10,11,11,12,12,12-heneicosafuorododecyl ester |
| 2218-54-4 | Sodium perfluorobutanoate (reportable under TRI as of 1/1/23) |
| 2263-09-4 | 1-Octanesulfonamide, N-butyl-1,1,2,2,3,3,4,4,5,5,6,6,7,7,8,8,8-heptadecafluoro-N-(2-hydroxyethyl)- |
| 2795-39-3 | Potassium perfluorooctanesulfonate |
| 2395-00-8 | Potassium perfluorooctanoate (reportable under TRI as of 1/1/21) |
| 2923-26-4 | Sodium perfluorohexanoate (reportable under TRI as of 1/1/24) |
| 2966-54-3 | Potassium perfluorobutanoate (reportable under TRI as of 1/1/23) |
| 2991-51-7 | Glycine, N-ethyl-N-[(heptadecafluorooctyl)sulfonyl]-, potassium salt |
| 3107-18-4 | Cyclohexanesulfonic acid, undecafluoro-, potassium salt |
| 3825-26-1 | Ammonium perfluorooctanoate |

| CAS | Chemical Name |
|------------|--|
| 3871-99-6 | 1-Hexanesulfonic acid, 1,1,2,2,3,3,4,4,5,5,6,6-tridecafluoro-, potassium salt |
| 3872-25-1 | 1-Pentanesulfonic acid, 1,1,2,2,3,3,4,4,5,5,5-undecafluoro-, potassium salt |
| 4151-50-2 | Sulfluramid |
| 4980-53-4 | 2-Propenoic acid, 2-methyl-, 3,3,4,4,5,5,6,6,7,7,8,8,9,9,10,10,11,11,12,12,13,13,14,14,15,15,16,16,16- nonacosafluorohexadecyl ester |
| 6014-75-1 | 2-Propenoic acid, 2-methyl-, 3,3,4,4,5,5,6,6,7,7,8,8,9,9,10,10,11,11,12,12,13,13,14,14,14- pentacosafluorotetradecyl ester |
| 10495-86-0 | Ammonium perfluorobutanoate (reportable under TRI as of 1/1/23) |
| 13252-13-6 | Hexafluoropropylene oxide dimer acid |
| 16517-11-6 | Octadecanoic acid, pentatriacontafluoro- |
| 17202-41-4 | 1-Nonanesulfonic acid, 1,1,2,2,3,3,4,4,5,5,6,6,7,7,8,8,9,9,9-nonadecafluoro-, ammonium salt |
| 17741-60-5 | 1,1,2,2-Tetrahydroperfluorododecyl acrylate |
| 21615-47-4 | Ammonium perfluorohexanoate (reportable under TRI as of 1/1/24) |
| 21652-58-4 | Perfluorooctyl Ethylene |
| 24448-09-7 | 1-Octanesulfonamide, 1,1,2,2,3,3,4,4,5,5,6,6,7,7,8,8,8-heptadecafluoro-N-(2- hydroxyethyl)-N-methyl- |
| 25268-77-3 | 2-[[Heptadecafluorooctyl)sulfonyl]methylamino]ethyl acrylate |
| 27619-90-5 | 1-Decanesulfonyl chloride, 3,3,4,4,5,5,6,6,7,7,8,8,9,9,10,10,10-heptadecafluoro- |
| 27619-91-6 | 1-Dodecanesulfonyl chloride, 3,3,4,4,5,5,6,6,7,7,8,8,9,9,10,10,11,11,12,12,12- heneicosafuoro- |
| 27905-45-9 | 1,1,2,2-Tetrahydroperfluorodecyl acrylate |
| 29081-56-9 | 1-Octanesulfonic acid, 1,1,2,2,3,3,4,4,5,5,6,6,7,7,8,8,8-heptadecafluoro-, ammonium salt |
| 29117-08-6 | Poly(oxy-1,2-ethanediyl), α -[2-[ethyl[(heptadecafluorooctyl)sulfonyl]amino]ethyl]- ω - hydroxy- |

| CAS | Chemical Name |
|------------|--|
| 29420-49-3 | Potassium perfluorobutane sulfonate (reportable under TRI as of 1/1/22) |
| 29457-72-5 | Lithium (perfluorooctane)sulfonate |
| 30046-31-2 | Tetradecane, 1,1,1,2,2,3,3,4,4,5,5,6,6,7,7,8,8,9,9,10,10,11,11,12,12-pentacosafuoro-14-iodo- |
| 31506-32-8 | 1-Octanesulfonamide, 1,1,2,2,3,3,4,4,5,5,6,6,7,7,8,8,8-heptadecafluoro-N-methyl- |
| 34362-49-7 | 1,1,2,2-Tetrahydroperfluorohexadecyl acrylate |
| 34395-24-9 | 1,1,2,2-Tetrahydroperfluorotetradecyl acrylate |
| 37338-48-0 | Poly[oxy(methyl-1,2-ethanediyl)], α -[2-[ethyl[(heptadecafluorooctyl)sulfonyl]amino]ethyl]- ω -hydroxy- |
| 38006-74-5 | 1-Propanaminium, 3-[[heptadecafluorooctyl)sulfonyl]amino]-N,N,N-trimethyl-, chloride |
| 39239-77-5 | 1-Tetradecanol, 3,3,4,4,5,5,6,6,7,7,8,8,9,9,10,10,11,11,12,12,13,13,14,14,14-pentacosafuoro- |
| 45048-62-2 | Perfluorobutanoate (reportable under TRI as of 1/1/23) |
| 52166-82-2 | 1-Propanaminium, N,N,N-trimethyl-3-[[tridecafluorohexyl)sulfonyl]amino]-, chloride |
| 55910-10-6 | Glycine, N-[(heptadecafluorooctyl)sulfonyl]-N-propyl-, potassium salt |
| 56372-23-7 | Poly(oxy-1,2-ethanediyl), α -[2-[ethyl[(tridecafluorohexyl)sulfonyl]amino]ethyl]- ω -hydroxy- |
| 56773-42-3 | Ethanaminium, N,N,N-triethyl-, salt with 1,1,2,2,3,3,4,4,5,5,6,6,7,7,8,8,8-heptadecafluoro-1-octanesulfonic acid (1:1) |
| 59071-10-2 | 2-Propenoic acid, 2-[ethyl[(pentadecafluoroheptyl)sulfonyl]amino]ethyl ester |
| 60270-55-5 | 1-Heptanesulfonic acid, 1,1,2,2,3,3,4,4,5,5,6,6,7,7,7-pentadecafluoro-, potassium salt |
| 60699-51-6 | 1-Hexadecanol, 3,3,4,4,5,5,6,6,7,7,8,8,9,9,10,10,11,11,12,12,13,13,14,14,15,15,16,16,16-nonacosafuoro- |
| 61660-12-6 | 1-Octanesulfonamide, N-ethyl-1,1,2,2,3,3,4,4,5,5,6,6,7,7,8,8,8-heptadecafluoro-N-[3-(trimethoxysilyl)propyl]- |

| CAS | Chemical Name |
|------------|---|
| 61798-68-3 | Pyridinium, 1-(3,3,4,4,5,5,6,6,7,7,8,8,9,9,10,10,10-heptafluorodecyl)-, salt with 4-methylbenzenesulfonic acid (1:1) |
| 62037-80-3 | Hexafluoropropylene oxide dimer acid ammonium salt |
| 65104-45-2 | 2-Propenoic acid, 2-methyl-, 3,3,4,4,5,5,6,6,7,7,8,8,9,9,10,10,11,11,12,12,12-heneicosafuorododecyl ester, polymer with 3,3,4,4,5,5,6,6,7,7,8,8,9,9,10,10,10-heptafluorodecyl 2-methyl-2-propenoate, methyl 2-methyl-2-propenoate, 3,3,4,4,5,5,6,6,7,7,8,8,9,9,10,10,11,11,12,12,13,13,14,14,14-pentacosafuorotetradecyl 2-methyl-2-propenoate and 3,3,4,4,5,5,6,6,7,7,8,8,8-tridecafluorooctyl 2-methyl-2-propenoate (reportable under TRI as of 1/1/21) |
| 65104-65-6 | 1-Eicosanol, 3,3,4,4,5,5,6,6,7,7,8,8,9,9,10,10,11,11,12,12,13,13,14,14,15,15,16,16,17,17,18,18,19,19,20,20,20-heptatriacontafuoro- |
| 65104-67-8 | 1-Octadecanol, 3,3,4,4,5,5,6,6,7,7,8,8,9,9,10,10,11,11,12,12,13,13,14,14,15,15,16,16,17,17,18,18,18-tritriacontafuoro- |
| 65510-55-6 | Hexadecane, 1,1,1,2,2,3,3,4,4,5,5,6,6,7,7,8,8,9,9,10,10,11,11,12,12,13,13,14,14,14-nonacosafuoro-16-iodo- |
| 65530-59-8 | Poly(difluoromethylene), α -fluoro- ω -(2-hydroxyethyl)-, 2-hydroxy-1,2,3-propanetricarboxylate (3:1) |
| 65530-61-2 | Poly(difluoromethylene), α -fluoro- ω -[2-(phosphonoxy)ethyl]- |
| 65530-62-3 | Poly(difluoromethylene), α,α' -[phosphinicobis(oxy-2,1-ethanediyl)]bis[ω -fluoro- |
| 65530-63-4 | Ethanol, 2,2'-iminobis-, compd. with α -fluoro- ω -[2-(phosphonoxy)ethyl]poly(difluoromethylene) (2:1) |
| 65530-64-5 | Ethanol, 2,2'-iminobis-, compd. with α,α' -[phosphinicobis(oxy-2,1-ethanediyl)]bis[ω -fluoropoly(difluoromethylene)] (1:1) |
| 65530-65-6 | Poly(difluoromethylene), α -fluoro- ω -[2-[(1-oxooctadecyl)oxy]ethyl]- |
| 65530-66-7 | Poly(difluoromethylene), α -fluoro- ω -[2-[(2-methyl-1-oxo-2-propenyl)oxy]ethyl]- |
| 65530-69-0 | Poly(difluoromethylene), α -[2-[(2-carboxyethyl)thio]ethyl]- ω -fluoro-, lithium salt |
| 65530-70-3 | Poly(difluoromethylene), α,α' -[phosphinicobis(oxy-2,1-ethanediyl)]bis[ω -fluoro-, ammonium salt |
| 65530-71-4 | Poly(difluoromethylene), α -fluoro- ω -[2-(phosphonoxy)ethyl]-, monoammonium salt |

| CAS | Chemical Name |
|------------|---|
| 65530-72-5 | Poly(difluoromethylene), α -fluoro- ω -[2-(phosphonoxy)ethyl]-, diammonium salt |
| 65530-74-7 | Ethanol, 2,2'-iminobis-, compd. with α -fluoro- ω -[2-(phosphonoxy)ethyl]poly(difluoromethylene) (1:1) |
| 65530-83-8 | Poly(difluoromethylene), α -[2-[(2-carboxyethyl)thio]ethyl]- ω -fluoro- |
| 65545-80-4 | Poly(oxy-1,2-ethanediyl), α -hydro- ω -hydroxy-, ether with α -fluoro- ω -(2-hydroxyethyl)poly(difluoromethylene) (1:1) |
| 65605-56-3 | Poly(difluoromethylene), α -fluoro- ω -(2-hydroxyethyl)-, dihydrogen 2-hydroxy-1,2,3-propanetricarboxylate |
| 65605-57-4 | Poly(difluoromethylene), α -fluoro- ω -(2-hydroxyethyl)-, hydrogen 2-hydroxy-1,2,3-propanetricarboxylate |
| 65605-58-5 | 2-Propenoic acid, esters, 2-methyl-, dodecyl ester, polymer with α -fluoro- ω -[2-[(2-methyl-1-oxo-2-propen-1-yl)oxy]ethyl]poly(difluoromethylene) |
| 65605-59-6 | 2-Propenoic acid, 2-methyl-, dodecyl ester, polymer with α -fluoro- ω -[2-[(2-methyl-1-oxo-2-propen-1-yl)oxy]ethyl]poly(difluoromethylene) and N-(hydroxymethyl)-2-propenamide |
| 65605-73-4 | Poly(difluoromethylene), α -fluoro- ω -[2-[(1-oxo-2-propenyl)oxy]ethyl]-, homopolymer |
| 65636-35-3 | Ethanaminium, N,N-diethyl-N-methyl-2-[(2-methyl-1-oxo-2-propenyl)oxy]-, methyl sulfate, polymer with 2-ethylhexyl 2-methyl-2-propenoate, α -fluoro- ω -[2-[(2-methyl-1-oxo-2-propenyl)oxy]ethyl]poly(difluoromethylene), 2-hydroxyethyl 2-methyl-2-propenoate and N-(hydroxymethyl)-2-propenamide |
| 67584-42-3 | Cyclohexanesulfonic acid, decafluoro(pentafluoroethyl)-, potassium salt |
| 67584-52-5 | Glycine, N-ethyl-N-[(undecafluoropentyl)sulfonyl]-, potassium salt |
| 67584-53-6 | Glycine, N-ethyl-N-[(tridecafluoroethyl)sulfonyl]-, potassium salt |
| 67584-56-9 | 2-Propenoic acid, 2-[methyl[(undecafluoropentyl)sulfonyl]amino]ethyl ester |
| 67584-57-0 | 2-Propenoic acid, 2-[methyl[(tridecafluoroethyl)sulfonyl]amino]ethyl ester |
| 67584-58-1 | 1-Propanaminium, N,N,N-trimethyl-3-[[[pentadecafluoroheptyl)sulfonyl]amino]-, iodide |
| 67584-62-7 | Glycine, N-ethyl-N-[(pentadecafluoroheptyl)sulfonyl]-, potassium salt |
| 67905-19-5 | Perfluoropalmitic acid |

| CAS | Chemical Name |
|------------|---|
| 67906-42-7 | 1-Decanesulfonic acid, 1,1,2,2,3,3,4,4,5,5,6,6,7,7,8,8,9,9,10,10,10-heneicosafuoro-, ammonium salt |
| 67969-69-1 | 1-Octanesulfonamide, N-ethyl-1,1,2,2,3,3,4,4,5,5,6,6,7,7,8,8,8-heptadecafluoro-N-[2-(phosphonooxy)ethyl]-, diammonium salt |
| 68084-62-8 | 2-Propenoic acid, 2-[methyl[(pentadecafluoroheptyl)sulfonyl]amino]ethyl ester |
| 68140-18-1 | Thiols, C4-10, γ - ω -perfluoro |
| 68140-20-5 | Thiols, C6-12, γ - ω -perfluoro |
| 68140-21-6 | Thiols, C10-20, γ - ω -perfluoro |
| 68141-02-6 | Chromium(III) perfluorooctanoate |
| 68156-01-4 | Cyclohexanesulfonic acid, nonafluorobis(trifluoromethyl)-, potassium salt |
| 68156-07-0 | Cyclohexanesulfonic acid, decafluoro(trifluoromethyl)-, potassium salt |
| 68187-25-7 | Butanoic acid, 4-[[3-(dimethylamino)propyl]amino]-4-oxo-, 2(or 3)-[γ - ω -perfluoro-C6-20-alkyl]thio] derivs. |
| 68187-47-3 | 1-Propanesulfonic acid, 2-methyl-, 2-[[1-oxo-3-[γ - ω -perfluoro-C4-16-alkyl]thio]propyl]amino] derivs., sodium salts |
| 68188-12-5 | Alkyl iodides, C4-20, γ - ω -perfluoro |
| 68227-96-3 | 2-Propenoic acid, butyl ester, telomer with 2-[[heptadecafluorooctyl)sulfonyl]methylamino]ethyl 2-propenoate, 2-[methyl[(nonafluorobutyl)sulfonyl]amino]ethyl 2-propenoate, α -(2-methyl-1-oxo-2-propenyl)- ω -hydroxypoly(oxy-1,4-butanediyl), α -(2-methyl-1-oxo-2-propenyl)- ω -[(2-methyl-1-oxo-2-propenyl)oxy]poly(oxy-1,4-butanediyl), 2-[methyl[(pentadecafluoroheptyl)sulfonyl]amino]ethyl 2-propenoate, 2-[methyl[(tridecafluorohexyl)sulfonyl]amino]ethyl 2-propenoate, 2-[methyl[(undecafluoropentyl)sulfonyl]amino]ethyl 2-propenoate and 1-octanethiol |
| 68239-43-0 | 2-Propenoic acid, 2-methyl-, 2-ethylhexyl ester, polymer with α -fluoro- ω -[2-[(2-methyl-1-oxo-2-propen-1-yl)oxy]ethyl]poly(difluoromethylene), 2-hydroxyethyl 2-methyl-2-propenoate and N-(hydroxymethyl)-2-propenamide |
| 68259-07-4 | 1-Heptanesulfonic acid, 1,1,2,2,3,3,4,4,5,5,6,6,7,7,7-pentadecafluoro-, ammonium salt |
| 68259-08-5 | 1-Hexanesulfonic acid, 1,1,2,2,3,3,4,4,5,5,6,6,6-tridecafluoro-, ammonium salt |

| CAS | Chemical Name |
|------------|---|
| 68259-09-6 | 1-Pentanesulfonic acid, 1,1,2,2,3,3,4,4,5,5,5-undecafluoro-, ammonium salt |
| 68259-38-1 | Poly[oxy(methyl-1,2-ethanediyl)], α -[2-[ethyl[(tridecafluorohexyl)sulfonyl]amino]ethyl]- ω -hydroxy- |
| 68259-39-2 | Poly[oxy(methyl-1,2-ethanediyl)], α -[2-[ethyl[(pentadecafluoroheptyl)sulfonyl]amino]ethyl]- ω -hydroxy- |
| 68298-62-4 | 2-Propenoic acid, 2-[butyl[(heptadecafluorooctyl)sulfonyl]amino]ethyl ester, telomer with 2-[butyl[(pentadecafluoroheptyl)sulfonyl]amino]ethyl 2-propenoate, methyloxirane polymer with oxirane di-2-propenoate, methyloxirane polymer with oxirane mono-2-propenoate and 1-octanethiol |
| 68298-80-6 | Poly(oxy-1,2-ethanediyl), α -[2-[ethyl[(undecafluoropentyl)sulfonyl]amino]ethyl]- ω -hydroxy- |
| 68298-81-7 | Poly(oxy-1,2-ethanediyl), α -[2-[ethyl[(pentadecafluoroheptyl)sulfonyl]amino]ethyl]- ω -hydroxy- |
| 68310-17-8 | Poly[oxy(methyl-1,2-ethanediyl)], α -[2-[ethyl[(undecafluoropentyl)sulfonyl]amino]ethyl]- ω -hydroxy- |
| 68391-08-2 | Alcohols, C8-14, γ - ω -perfluoro |
| 68412-68-0 | Phosphonic acid, perfluoro-C6-12-alkyl derivs. |
| 68412-69-1 | Phosphinic acid, bis(perfluoro-C6-12-alkyl) derivs. |
| 68515-62-8 | 1,4-Benzenedicarboxylic acid, dimethyl ester, reaction products with bis(2-hydroxyethyl)terephthalate, ethylene glycol, α -fluoro- ω -(2-hydroxyethyl)poly(difluoromethylene), hexakis(methoxymethyl)melamine and polyethylene glycol |
| 68555-74-8 | 1-Pentanesulfonamide, 1,1,2,2,3,3,4,4,5,5,5-undecafluoro-N-(2-hydroxyethyl)-N-methyl- |
| 68555-75-9 | 1-Hexanesulfonamide, 1,1,2,2,3,3,4,4,5,5,6,6,6-tridecafluoro-N-(2-hydroxyethyl)-N-methyl- |
| 68555-76-0 | 1-Heptanesulfonamide, 1,1,2,2,3,3,4,4,5,5,6,6,7,7,7-pentadecafluoro-N-(2-hydroxyethyl)-N-methyl- |
| 68555-81-7 | 1-Propanaminium, N,N,N-trimethyl-3-[[[(pentadecafluoroheptyl)sulfonyl]amino]-, chloride |

| CAS | Chemical Name |
|------------|---|
| 68555-91-9 | 2-Propenoic acid, 2-methyl-, 2-[ethyl[(heptadecafluorooctyl)sulfonyl]amino]ethyl ester, polymer with 2-[ethyl[(nonafluorobutyl)sulfonyl]amino]ethyl 2-methyl-2-propenoate, 2-[ethyl[(pentadecafluoroheptyl)sulfonyl]amino]ethyl 2-methyl-2-propenoate, 2-[ethyl[(tridecafluorohexyl)sulfonyl]amino]ethyl 2-methyl-2-propenoate, 2-[ethyl[(undecafluoropentyl)sulfonyl]amino]ethyl 2-methyl-2-propenoate and octadecyl 2-methyl-2-propenoate |
| 68758-57-6 | 1-Tetradecanesulfonyl chloride, 3,3,4,4,5,5,6,6,7,7,8,8,9,9,10,10,11,11,12,12,13,13,14,14,14-pentacosafuoro- |
| 68867-60-7 | 2-Propenoic acid, 2-[[heptadecafluorooctyl)sulfonyl]methylamino]ethyl ester, polymer with 2-[methyl[(nonafluorobutyl)sulfonyl]amino]ethyl 2-propenoate, 2-[methyl[(pentadecafluoroheptyl)sulfonyl]amino]ethyl 2-propenoate, 2-[methyl[(tridecafluorohexyl)sulfonyl]amino]ethyl 2-propenoate, 2-[methyl[(undecafluoropentyl)sulfonyl]amino]ethyl 2-propenoate and α -(1-oxo-2-propenyl)- ω -methoxypoly(oxy-1,2-ethanediyl) |
| 68957-55-1 | 1-Propanaminium, N,N,N-trimethyl-3-[[undecafluoropentyl)sulfonyl]amino]-, chloride |
| 68957-57-3 | 1-Propanaminium, N,N,N-trimethyl-3-[[undecafluoropentyl)sulfonyl]amino]-, iodide |
| 68957-58-4 | 1-Propanaminium, N,N,N-trimethyl-3-[[tridecafluorohexyl)sulfonyl]amino]-, iodide |
| 68957-62-0 | 1-Heptanesulfonamide, N-ethyl-1,1,2,2,3,3,4,4,5,5,6,6,7,7,7-pentadecafluoro- |
| 68958-60-1 | Poly(oxy-1,2-ethanediyl), α -[2-[ethyl[(pentadecafluoroheptyl)sulfonyl]amino]ethyl]- ω -methoxy- |
| 68958-61-2 | Poly(oxy-1,2-ethanediyl), α -[2-[ethyl[(heptadecafluorooctyl)sulfonyl]amino]ethyl]- ω -methoxy- |
| 70225-14-8 | 1-Octanesulfonic acid, 1,1,2,2,3,3,4,4,5,5,6,6,7,7,8,8,8-heptadecafluoro-, compd. with 2,2'-iminobis[ethanol] (1:1) |
| 70225-15-9 | 1-Heptanesulfonic acid, 1,1,2,2,3,3,4,4,5,5,6,6,7,7,7-pentadecafluoro-, compd. with 2,2'-iminobis[ethanol] (1:1) |
| 70225-16-0 | 1-Hexanesulfonic acid, 1,1,2,2,3,3,4,4,5,5,6,6,6-tridecafluoro-, compd. with 2,2'-iminobis[ethanol] (1:1) |
| 70225-17-1 | 1-Pentanesulfonic acid, 1,1,2,2,3,3,4,4,5,5,5-undecafluoro-, compd. with 2,2'-iminobis[ethanol] (1:1) |
| 70969-47-0 | Thiols, C8-20, γ - ω -perfluoro, telomers with acrylamide |

| CAS | Chemical Name |
|-------------|---|
| 70983-59-4 | Poly(oxy-1,2-ethanediyl), α -methyl- ω -hydroxy-, 2-hydroxy-3-[(γ - ω -perfluoro-C6-20-alkyl)thio]propyl ethers |
| 70983-60-7 | 1-Propanaminium, 2-hydroxy-N,N,N-trimethyl-, 3-[(γ - ω -perfluoro-C6-20-alkyl)thio] derivs., chlorides |
| 71608-60-1 | Pentanoic acid, 4,4-bis[(γ - ω -perfluoro-C8-20-alkyl)thio] derivs. |
| 72623-77-9 | Fatty acids, C6-18, perfluoro, ammonium salts |
| 72968-38-8 | Fatty acids, C7-13, perfluoro, ammonium salts |
| 74499-44-8 | Phosphoric acid, γ - ω -perfluoro-C8-16-alkyl esters, compds. with diethanolamine |
| 78560-44-8 | Silane, trichloro(3,3,4,4,5,5,6,6,7,7,8,8,9,9,10,10,10-heptadecafluorodecyl)- |
| 80010-37-3 | Poly(difluoromethylene), α -fluoro- ω -[2-sulphoethyl]- |
| 82113-65-3 | 1,1,1-Trifluoro-N-[(trifluoromethyl)sulfonyl] methanesulfonamide (TFSI) (reportable under TRI as of 1/1/24) |
| 83048-65-1 | Silane, (3,3,4,4,5,5,6,6,7,7,8,8,9,9,10,10,10-heptadecafluorodecyl)trimethoxy- |
| 90076-65-6 | Lithium bis[(trifluoromethyl)sulfonyl] azanide (reportable under TRI as of 1/1/24) |
| 95144-12-0 | Poly(difluoromethylene), α -fluoro- ω -[2-(phosphonoxy)ethyl]-, ammonium salt |
| 97553-95-2 | Thiocyanic acid, γ - ω -perfluoro-C4-20-alkyl esters |
| 97659-47-7 | Alkenes, C8-14 α -, δ - ω -perfluoro |
| 118400-71-8 | Disulfides, bis(γ - ω -perfluoro-C6-20-alkyl) |
| 123171-68-6 | Poly(difluoromethylene), α -[2-(acetyloxy)-3-[(carboxymethyl)dimethylammonio]propyl]- ω -fluoro-, inner salt |
| 125476-71-3 | Silicic acid (H ₄ SiO ₄), disodium salt, reaction products with chlorotrimethylsilane and 3,3,4,4,5,5,6,6,7,7,8,8,9,9,10,10,10-heptadecafluoro-1-decanol |
| 135228-60-3 | Hexane, 1,6-diisocyanato-, homopolymer, γ - ω -perfluoro-C6-20-alc.-blocked |
| 142636-88-2 | 2-Propenoic acid, 2-methyl-, octadecyl ester, polymer with 3,3,4,4,5,5,6,6,7,7,8,8,9,9,10,10,11,11,12,12,12-heneicosafuorododecyl 2-propenoate, 3,3,4,4,5,5,6,6,7,7,8,8,9,9,10,10,10-heptadecafluorodecyl 2-propenoate and 3,3,4,4,5,5,6,6,7,7,8,8,9,9,10,10,11,11,12,12,13,13,14,14,14-pentacosafuorotetradecyl 2-propenoate |

| CAS | Chemical Name |
|-------------|---|
| 143372-54-7 | Siloxanes and Silicones, (3,3,4,4,5,5,6,6,7,7,8,8,9,9,10,10,10-heptadecafluorodecyl)oxy Me, hydroxy Me, Me octyl, ethers with polyethylene glycol mono-Me ether |
| 148240-85-1 | 1,3-Propanediol, 2,2-bis[[(γ - ω -perfluoro-C4-10-alkyl)thio]methyl] derivs., phosphates, ammonium salts |
| 148240-87-3 | 1,3-Propanediol, 2,2-bis[[(γ - ω -perfluoro-C6-12-alkyl)thio]methyl] derivs., phosphates, ammonium salts |
| 148240-89-5 | 1,3-Propanediol, 2,2-bis[[(γ - ω -perfluoro-C10-20-alkyl)thio]methyl] derivs., phosphates, ammonium salts |
| 150135-57-2 | 2-Propenoic acid, 2-methyl-, 2-(dimethylamino)ethyl ester, polymers with Bu acrylate, γ - ω -perfluoro-C8-14-alkyl acrylate and polyethylene glycol monomethacrylate, 2,2'-azobis[2,4-dimethylpentanenitrile]-initiated |
| 178094-69-4 | 1-Octanesulfonamide, N-[3-(dimethyloxidoamino)propyl]-1,1,2,2,3,3,4,4,5,5,6,6,7,7,8,8,8-heptadecafluoro-, potassium salt |
| 178535-23-4 | Fatty acids, linseed-oil, γ - ω -perfluoro-C8-14-alkyl esters |
| 180582-79-0 | Sulfonic acids, C6-12-alkane, γ - ω -perfluoro, ammonium salts |
| 182176-52-9 | Ethaneperoxy acid, reaction products with 3,3,4,4,5,5,6,6,7,7,8,8,9,9,10,10,10-heptadecafluorodecyl thiocyanate and 3,3,4,4,5,5,6,6,7,7,8,8,8-tridecafluorooctyl thiocyanate |
| 196316-34-4 | 2-Propenoic acid, 2-methyl-, 2-(dimethylamino)ethyl ester, polymers with γ - ω -perfluoro-C10-16-alkyl acrylate and vinyl acetate, acetates |
| 200513-42-4 | 2-Propenoic acid, 2-methyl-, polymer with butyl 2-methyl-2-propenoate, 3,3,4,4,5,5,6,6,7,7,8,8,9,9,10,10,10-heptadecafluorodecyl 2-propenoate, 2-hydroxyethyl 2-methyl-2-propenoate and methyl 2-methyl-2-propenoate |
| 203743-03-7 | 2-Propenoic acid, 2-methyl-, hexadecyl ester, polymers with 2-hydroxyethyl methacrylate, γ - ω -perfluoro-C10-16-alkyl acrylate and stearyl methacrylate (reportable under TRI as of 1/1/22) |
| 238420-68-3 | Propanedioic acid, mono(γ - ω -perfluoro-C8-12-alkyl) derivs., di-me esters |
| 238420-80-9 | Propanedioic acid, mono(γ - ω -perfluoro-C8-12-alkyl) derivs., bis[4-(ethenyloxy)butyl] esters |
| 45187-15-3 | Perfluorobutanesulfonate (reportable under TRI as of 1/1/22) |

| CAS | Chemical Name |
|--------------|--|
| 1078142-10-5 | 1,3-Propanediol, 2,2-bis[[γ-ω-perfluoro-C6-12-alkyl)thio]methyl] derivs., polymers with 2,2-bis[[γ-ω-perfluoro-C10-20-alkyl)thio]methyl]-1,3-propanediol, 1,6-diisocyanato-2,2,4(or 2,4,4)-trimethylhexane, 2-heptyl-3,4-bis(9-isocyanatononyl)-1-pentylcyclohexane and 2,2'-(methylimino)bis[ethanol] |
| 1078712-88-5 | Thiols, C4-20, γ-ω-perfluoro, telomers with acrylamide and acrylic acid, sodium salts |
| 1078715-61-3 | 1-Propanaminium, 3-amino-N-(carboxymethyl)-N,N-dimethyl-, N-[2-[(γ-ω-perfluoro-C4-20-alkyl)thio]acetyl] derivs., inner salts |
| 2728655-42-1 | Alcohols, C8-16, γ-ω-perfluoro, reaction products with 1,6-diisocyanatohexane, glycidol and stearyl alc. (reportable under TRI as of 1/1/23) |
| 2738952-61-7 | Acetamide, N-[3-(dimethylamino)propyl]-, 2-[(γ-ω-perfluoro-C4-20-alkyl)thio] derivs. (reportable under TRI as of 1/1/23) |
| 2744262-09-5 | Acetic acid, 2-[(γ-ω-perfluoro-C4-20-alkyl)thio] derivs., 2-hydroxypropyl esters (reportable under TRI as of 1/1/23) |
| 2742694-36-4 | Acetamide, N-(2-aminoethyl)-, 2-[(γ-ω-perfluoro-C4-20-alkyl)thio] derivs., polymers with N1,N1-dimethyl-1,3-propanediamine, epichlorohydrin and ethylenediamine, oxidized (reportable under TRI as of 1/1/23) |
| 2816091-53-7 | Betaines, dimethyl(.gamma.-.omega.-perfluoro-.gamma.-hydro-C8-18-alkyl) (reportable under TRI as of 1/1/24) |

The following PFAS in Table 2 were already individually reportable under TURA. Continue to report them at typical TURA reporting thresholds.

Table 2. PFAS Substances to continue reporting individually when exceeding normal reporting thresholds

| CAS | Chemical Name |
|----------|---|
| 76-14-2 | 1,2-Dichloro-1,1,2,2-tetrafluoroethane |
| 76-15-3 | Chloropentafluoroethane |
| 116-14-3 | Tetrafluoroethylene |
| 124-73-2 | 1,2-Dibromotetrafluoroethane |
| 354-25-6 | 1-chloro-1,1,2,2-tetrafluoroethane |
| 422-56-0 | 3,3-Dichloro-1,1,1,2,2-pentafluoropropane |
| 507-55-1 | 1,3-Dichloro-1,1,2,2,3-pentafluoropropane |

| CAS | Chemical Name |
|-----------|------------------------------------|
| 2837-89-0 | 2-Chloro-1,1,1,2-tetrafluoroethane |

The following PFAS are reportable under the TURA C1-C4 Halogenated Hydrocarbons category. The substances shaded in gray at the bottom are **ALSO** reportable under the new Certain PFAS NOL TURA category. Report the chemicals in gray as **BOTH** C1-C4 Halogenated Hydrocarbons **AND** as Certain PFAS NOL for the substances in gray. Only one fee will be due.

Table 3. PFAS Substances reportable under the TURA C1-C4 Halogenated Hydrocarbons category

| CAS | Chemical Name |
|----------|-------------------------------------|
| 76-16-4 | Pentafluoroethane |
| 76-17-5 | 1,2,3-Trichloropentafluoropropane |
| 116-15-4 | Hexafluoropropene |
| 335-44-4 | 2,2,3-Trichloroheptafluorobutane |
| 354-33-6 | Pentafluoroethane |
| 354-64-3 | pentafluoroiodoethane |
| 359-35-3 | 1,1,2,2-Tetrafluoroethane |
| 360-89-4 | Perfluorobut-2-ene |
| 374-07-2 | 1,1-Dichlorotetrafluoroethane |
| 382-10-5 | 1,1-Bis(trifluoromethyl)ethene |
| 421-73-8 | 1,1,1,2-Tetrafluoro-2-chloropropane |
| 431-31-2 | 1,1,1,2,3-Pentafluoropropane |
| 431-63-0 | 1,1,1,2,3,3-Hexafluoropropane |
| 431-89-0 | 2H-Perfluoropropane |
| 677-69-0 | Heptafluoro-2-iodopropane |
| 690-39-1 | 1,1,1,3,3,3-Hexafluoropropane |
| 754-12-1 | 2,3,3,3-Tetrafluoropropene |
| 811-97-2 | 1,1,1,2-Tetrafluoroethane |

| CAS | Chemical Name |
|------------|---|
| 1320-37-2 | Dichlorotetrafluoroethane |
| 2252-83-7 | 1,2,3,3,3-Pentafluoropropene |
| 18599-20-7 | 1,4-Dibromo-1,1,2,2-tetrafluorobutane |
| 18599-22-9 | 2-Vinyl(1-bromoperfluoroethane) |
| 25398-32-7 | Ethene, 1,1,2,2-tetrafluoro-, telomer with 1,1,1,2,2-pentafluoro-2-iodoethane |
| 76-19-7 | Propane, 1,1,1,2,2,3,3,3-octafluoro- |
| 115-25-3 | Cyclobutane, 1,1,2,2,3,3,4,4-octafluoro- |
| 355-25-9 | Butane, 1,1,1,2,2,3,3,4,4,4-decafluoro- |
| 423-39-2 | Butane, 1,1,1,2,2,3,3,4,4-nonafluoro-4-iodo- |
| 754-34-7 | Propane, 1,1,1,2,2,3,3-heptafluoro-3-iodo- |

Table 4 is a list of PFAS that **are reported as part of the Certain PFAS NOL category**. Again, this list was generated from PFAS that are known to be in commerce, primarily from the Toxic Substances Control Act (TSCA). This list is **NOT** exhaustive.

Substances in gray have been listed by TRI for reporting year 2025/2026 at 100 lb/year threshold. **Nine new PFAS** were added to the [Toxics Release Inventory \(TRI\) list](#), with a 100-pound reporting threshold, for TRI reporting year 2025 (for TRI reports due July 1, 2026). The TURA Administrative Council added these nine new PFAS to the TURA chemical list for reporting year **2026 (for reports due July 1, 2027)**. **One new PFAS** was added to the [Toxics Release Inventory \(TRI\) list](#), with a 100-pound reporting threshold, for TRI reporting year 2026 (for TRI reports due July 1, 2027). This PFAS has not yet been voted on by the TURA Administrative Council.

Table 4. PFAS Substances Known to be in Commerce that are Reported as part of the Certain PFAS NOL Category

| CAS | Chemical Name |
|----------|--|
| 306-91-2 | Phenanthrene, 1,1,2,2,3,3,4,4,4a,4b,5,5,6,6,7,7,8,8,8a,9,9,10,10,10a-tetracosafuorotetradecahydro- |
| 306-94-5 | Naphthalene, 1,1,2,2,3,3,4,4,4a,5,5,6,6,7,7,8,8,8a-octadecafluorodecahydro- |
| 307-30-2 | 1-Octanol, 2,2,3,3,4,4,5,5,6,6,7,7,8,8,8-pentadecafluoro- |
| 307-34-6 | Octane, 1,1,1,2,2,3,3,4,4,5,5,6,6,7,7,8,8,8-octadecafluoro- |

| CAS | Chemical Name |
|----------|--|
| 307-60-8 | Dodecane, 1,1,1,2,2,3,3,4,4,5,5,6,6,7,7,8,8,9,9,10,10,11,11,12,12-pentacosafuoro-12-iodo- |
| 307-63-1 | Tetradecane, 1,1,1,2,2,3,3,4,4,5,5,6,6,7,7,8,8,9,9,10,10,11,11,12,12,13,13,14,14-nonacosafuoro-14-iodo- |
| 307-70-0 | 1-Undecanol, 2,2,3,3,4,4,5,5,6,6,7,7,8,8,9,9,10,10,11,11-eicosafuoro- |
| 307-98-2 | 2-Propenoic acid, 2,2,3,3,4,4,5,5,6,6,7,7,8,8,8-pentadecafluorooctyl ester |
| 311-89-7 | 1-Butanamine, 1,1,2,2,3,3,4,4,4-nonafluoro-N,N-bis(1,1,2,2,3,3,4,4,4-nonafluorobutyl)- |
| 335-27-3 | Cyclohexane, 1,1,2,2,3,3,4,5,5,6-decafluoro-4,6-bis(trifluoromethyl)- |
| 335-36-4 | Cyclohexane, 1,1,2,2,3,3,4,5,5,6-decafluoro-4,6-bis(trifluoromethyl)- |
| 335-42-2 | Furan, 2,2,3,3,4,4,5-heptafluorotetrahydro-5-(1,1,2,2,3,3,4,4,4-nonafluorobutyl)- |
| 335-57-9 | Butanoyl fluoride, 2,2,3,3,4,4,4-heptafluoro- |
| 336-08-3 | Heptane, 1,1,1,2,2,3,3,4,4,5,5,6,6,7,7,7-hexadecafluoro- |
| 336-59-4 | Hexanedioic acid, 2,2,3,3,4,4,5,5-octafluoro- |
| 338-83-0 | Butanoic acid, 2,2,3,3,4,4,4-heptafluoro-, 1,1'-anhydride |
| 338-84-1 | 1-Propanamine, 1,1,2,2,3,3,3-heptafluoro-N,N-bis(1,1,2,2,3,3,3-heptafluoropropyl)- |
| 355-02-2 | Cyclohexane, 1,1,2,2,3,3,4,4,5,5,6-undecafluoro-6-(trifluoromethyl)- |
| 355-38-4 | Hexanoyl fluoride, 2,2,3,3,4,4,5,5,6,6,6-undecafluoro- |
| 355-42-0 | Hexane, 1,1,1,2,2,3,3,4,4,5,5,6,6,6-tetradecafluoro- |
| 355-43-1 | Hexane, 1,1,1,2,2,3,3,4,4,5,5,6,6,6-tridecafluoro-6-iodo- |
| 355-50-0 | Hexadecane, 1,1,1,2,2,3,3,4,4,5,5,6,6,7,7,8,8,9,9,10,10,11,11,12,12,13,13,14,14,15,15,16,16-tritriacontafuoro-16-iodo- |
| 355-80-6 | 1-Pentanol, 2,2,3,3,4,4,5,5-octafluoro- |
| 356-24-1 | Butanoic acid, 2,2,3,3,4,4,4-heptafluoro-, methyl ester |
| 356-27-4 | Butanoic acid, 2,2,3,3,4,4,4-heptafluoro-, ethyl ester |
| 375-00-8 | Butanenitrile, 2,2,3,3,4,4,4-heptafluoro- |

| CAS | Chemical Name |
|-----------|---|
| 375-01-9 | 1-Butanol, 2,2,3,3,4,4,4-heptafluoro- |
| 375-03-1 | Propane, 1,1,1,2,2,3,3-heptafluoro-3-methoxy- |
| 375-16-6 | Butanoyl chloride, 2,2,3,3,4,4,4-heptafluoro- |
| 375-22-4 | Butanoic acid, 2,2,3,3,4,4,4-heptafluoro- |
| 375-62-2 | Pentanoyl fluoride, 2,2,3,3,4,4,5,5,5-nonafluoro- |
| 375-72-4 | 1-Butanesulfonyl fluoride, 1,1,2,2,3,3,4,4,4-nonafluoro- |
| 375-84-8 | Heptanoyl fluoride, 2,2,3,3,4,4,5,5,6,6,7,7,7-tridecafluoro- |
| 375-85-9 | Heptanoic acid, 2,2,3,3,4,4,5,5,6,6,7,7,7-tridecafluoro- |
| 375-88-2 | Heptane, 1-bromo-1,1,2,2,3,3,4,4,5,5,6,6,7,7,7-pentadecafluoro- |
| 376-73-8 | Pentanedioic acid, 2,2,3,3,4,4-hexafluoro- |
| 376-90-9 | 1,5-Pentanediol, 2,2,3,3,4,4-hexafluoro- |
| 377-73-1 | Perfluoro-3-methoxypropanoic acid (reportable under TRI as of 1/1/25) |
| 382-28-5 | Morpholine, 2,2,3,3,5,5,6,6-octafluoro-4-(trifluoromethyl)- |
| 423-62-1 | Decane, 1,1,1,2,2,3,3,4,4,5,5,6,6,7,7,8,8,9,9,10,10-heneicosfluoro-10-iodo- |
| 425-38-7 | Propanoyl fluoride, 2,2,3,3-tetrafluoro-3-(trifluoromethoxy)- |
| 428-59-1 | Trifluoro(trifluoromethyl)oxirane |
| 559-40-0 | Cyclopentene, 1,2,3,3,4,4,5,5-octafluoro- |
| 647-42-7 | 1-Octanol, 3,3,4,4,5,5,6,6,7,7,8,8,8-tridecafluoro- |
| 678-26-2 | Pentane, 1,1,1,2,2,3,3,4,4,5,5,5-dodecafluoro- |
| 756-12-7 | 2-Butanone, 1,1,1,3,4,4,4-heptafluoro-3-(trifluoromethyl)- |
| 756-13-8 | 3-Pentanone, 1,1,1,2,2,4,5,5,5-nonafluoro-4-(trifluoromethyl)- |
| 773-14-8 | Furan, 2,2,3,3,4,4,5,5-octafluorotetrahydro- |
| 813-44-5 | Bis(perfluoroisopropyl)ketone |
| 813-45-6 | 3-Hexanone, 1,1,1,2,4,4,5,5,6,6,6-undecafluoro-2-(trifluoromethyl)- |
| 1547-26-8 | 1-Pentene, 2,3,3,4,4,5,5-heptafluoro- |

| CAS | Chemical Name |
|-----------|---|
| 1623-05-8 | Propane, 1,1,1,2,2,3,3-heptafluoro-3-[(1,2,2-trifluoroethenyl)oxy]- |
| 1682-78-6 | Propanoyl fluoride, 2,3,3,3-tetrafluoro-2-(1,1,2,2,2-pentafluoroethoxy)- |
| 1805-22-7 | Perfluoromethylcyclopentane |
| 1187-93-5 | Trifluoromethyl trifluorovinyl ether |
| 1892-03-1 | Cyclopentene, 1,3,3,4,4,5,5-heptafluoro- |
| 2043-47-2 | 1-Hexanol, 3,3,4,4,5,5,6,6,6-nonafluoro- |
| 2043-55-2 | Hexane, 1,1,1,2,2,3,3,4,4-nonafluoro-6-iodo- |
| 2043-57-4 | Octane, 1,1,1,2,2,3,3,4,4,5,5,6,6-tridecafluoro-8-iodo- |
| 2062-98-8 | Propanoyl fluoride, 2,3,3,3-tetrafluoro-2-(1,1,2,2,3,3,3-heptafluoropropoxy)- |
| 2144-53-8 | 2-Propenoic acid, 2-methyl-, 3,3,4,4,5,5,6,6,7,7,8,8,8-tridecafluorooctyl ester |
| 2218-54-4 | Butanoic acid, 2,2,3,3,4,4,4-heptafluoro-, sodium salt (1:1) |
| 2641-34-1 | Propanoyl fluoride, 2,3,3,3-tetrafluoro-2-[1,1,2,3,3,3-hexafluoro-2-(1,1,2,2,3,3,3-heptafluoropropoxy)propoxy]- |
| 2706-90-3 | Pentanoic acid, 2,2,3,3,4,4,5,5,5-nonafluoro- |
| 2927-83-5 | 2,3,3,3-Tetrafluoro-2-(trifluoromethoxy)propionyl fluoride |
| 2994-71-0 | Cyclobutane, 1,1,2,2,3,4-hexafluoro-3,4-bis(trifluoromethyl)- |
| 3108-42-7 | Ammonium perfluorodecanoate (reportable under TRI as of 1/1/25) |
| 3330-14-1 | Propane, 1-[1-[difluoro(1,2,2,2-tetrafluoroethoxy)methyl]-1,2,2,2-tetrafluoroethoxy]-1,1,2,2,3,3,3-heptafluoro- |
| 3330-15-2 | Perfluoro-3-(1H-perfluoroethoxy)propane |
| 3330-16-3 | 2H-Perfluoro(5,8-dimethyl-3,6,9-trioxadodecane) |
| 3794-64-7 | Butanoic acid, 2,2,3,3,4,4,4-heptafluoro-, silver(1+) salt (1:1) |
| 3830-45-3 | Sodium perfluorodecanoate (reportable under TRI as of 1/1/25) |
| 3934-23-4 | 2-Propenoic acid, 2-methyl-, 2,2,3,3,4,4,5,5,6,6,7,7,8,8,8-pentadecafluorooctyl ester |
| 4089-58-1 | Propanoyl fluoride, 2,3,3,3-tetrafluoro-2-[1,1,2,3,3,3-hexafluoro-2-[1,1,2,2-tetrafluoro-2-(fluorosulfonyl)ethoxy]propoxy]- |

| CAS | Chemical Name |
|------------|---|
| 6130-43-4 | Heptanoic acid, 2,2,3,3,4,4,5,5,6,6,7,7,7-tridecafluoro-, ammonium salt (1:1) |
| 6588-63-2 | Cyclohexanecarbonyl fluoride, 1,2,2,3,3,4,4,5,5,6,6-undecafluoro- |
| 9002-84-0 | Polytetrafluoroethylene |
| 9011-17-0 | Poly(vinylidene fluoride-co-hexafluoropropylene) |
| 10493-43-3 | Ethene, 1,1,2-trifluoro-2-(1,1,2,2-pentafluoroethoxy)- |
| 13221-71-1 | Hexafluoro-1,3-bis(trifluoromethyl)cyclobutane |
| 13429-24-8 | 1-Propene, 1,1,2,3,3,3-hexafluoro-, dimer |
| 13695-31-3 | 2-Propenoic acid, 2-methyl-, 2,2,3,3,4,4,4-heptafluorobutyl ester |
| 15290-77-4 | Cyclopentane, 1,1,2,2,3,3,4-heptafluoro- |
| 16090-14-5 | Ethanesulfonyl fluoride, 2-[1-[difluoro[(1,2,2-trifluoroethenyl)oxy]methyl]-1,2,2,2-tetrafluoroethoxy]-1,1,2,2-tetrafluoro- |
| 17527-29-6 | 2-Propenoic acid, 3,3,4,4,5,5,6,6,7,7,8,8,8-tridecafluorooctyl ester |
| 17631-68-4 | Europium, tris(6,6,7,7,8,8,8-heptafluoro-2,2-dimethyl-3,5-octanedionato- β O3, β O5)- |
| 17978-77-7 | Praseodymium, tris(6,6,7,7,8,8,8-heptafluoro-2,2-dimethyl-3,5-octanedionato- β O3, β O5)- |
| 19430-93-4 | 1-Hexene, 3,3,4,4,5,5,6,6,6-nonafluoro- |
| 20006-68-2 | Dichloro-3-(perfluoro-2-propoxy)propylmethylsilane |
| 24520-19-2 | Pentafluoro(1,2,2-trifluoro-2-((trifluorovinyl)oxy)-1-(trifluoromethyl)ethoxy)benzene |
| 25038-02-2 | Fomblin Y 04 |
| 25038-71-5 | poly(1,1,2,2-tetrafluorobutane-1,4-diyl) |
| 25067-11-2 | 1-Propene, 1,1,2,3,3,3-hexafluoro-, polymer with 1,1,2,2-tetrafluoroethene |
| 25190-89-0 | 1-Propene, 1,1,2,3,3,3-hexafluoro-, polymer with 1,1-difluoroethene and 1,1,2,2-tetrafluoroethene |
| 25291-17-2 | 1-Octene, 3,3,4,4,5,5,6,6,7,7,8,8,8-tridecafluoro- |
| 25684-76-8 | Ethene, 1,1,2,2-tetrafluoro-, polymer with 1,1-difluoroethene |
| 26425-79-6 | Ethene, 1,1,2,2-tetrafluoro-, polymer with 1,2,2-trifluoro-2-(trifluoromethoxy)ethene |

| CAS | Chemical Name |
|------------|---|
| 26650-09-9 | Thiocyanic acid, 3,3,4,4,5,5,6,6,7,7,8,8,8-tridecafluorooctyl ester |
| 26654-97-7 | Ethanesulfonyl fluoride, 2-[1-[difluoro[(1,2,2-trifluoroethenyl)oxy]methyl]-1,2,2,2-tetrafluoroethoxy]-1,1,2,2-tetrafluoro-, polymer with 1,1,2,2-tetrafluoroethene |
| 26655-00-5 | Propane, 1,1,1,2,2,3,3-heptafluoro-3-[(1,2,2-trifluoroethenyl)oxy]-, polymer with 1,1,2,2-tetrafluoroethene |
| 26655-00-5 | Perfluoroalkoxy alkanes (PFA) |
| 26658-70-8 | Benzene, pentafluoro[1,2,2-trifluoro-2-[(trifluoroethenyl)oxy]-1-(trifluoromethyl)ethoxy]-, polymer with tetrafluoroethene and trifluoro(trifluoromethoxy)ethene |
| 26738-51-2 | 3,6,9,12-Tetraoxapentadecane, 1,1,1,2,4,4,5,7,7,8,10,10,11,13,13,14,14,15,15,15-eicosafuoro-5,8,11-tris(trifluoromethyl)- |
| 26779-98-6 | Propanoic acid, ethenyl ester, polymer with 1,1-difluoroethene and 1,1,2,2-tetrafluoroethene |
| 27029-05-6 | 1-Propene, polymer with 1,1,2,2-tetrafluoroethene |
| 27619-88-1 | 1-Hexanesulfonyl chloride, 3,3,4,4,5,5,6,6,6-nonafluoro- |
| 27619-89-2 | 1-Octanesulfonyl chloride, 3,3,4,4,5,5,6,6,7,7,8,8,8-tridecafluoro- |
| 27619-94-9 | 6:2 Fluorotelomer sulfonate sodium salt (reportable under TRI as of 1/1/25) |
| 27619-97-2 | 1-Octanesulfonic acid, 3,3,4,4,5,5,6,6,7,7,8,8,8-tridecafluoro- |
| 29809-34-5 | Eicosane, 1,1,1,2,2,3,3,4,4,5,5,6,6,7,7,8,8,9,9,10,10,11,11,12,12,13,13,14,14,15,15,16,16,17,17,18,18,19,19,20,20-hentetracontafluoro-20-iodo- |
| 29809-35-6 | Octadecane, 1,1,1,2,2,3,3,4,4,5,5,6,6,7,7,8,8,9,9,10,10,11,11,12,12,13,13,14,14,15,15,16,16,17,17,18,18-heptatriacontafluoro-18-iodo- |
| 31175-20-9 | Ethanesulfonic acid, 2-[1-[difluoro[(1,2,2-trifluoroethenyl)oxy]methyl]-1,2,2,2-tetrafluoroethoxy]-1,1,2,2-tetrafluoro-, polymer with 1,1,2,2-tetrafluoroethene |
| 34454-97-2 | 1-Butanesulfonamide, 1,1,2,2,3,3,4,4,4-nonafluoro-N-(2-hydroxyethyl)-N-methyl- |
| 34455-29-3 | 1-Propanaminium, N-(carboxymethyl)-N,N-dimethyl-3-[[3,3,4,4,5,5,6,6,7,7,8,8,8-tridecafluorooctyl)sulfonyl]amino]-, inner salt |
| 34788-82-4 | Europium, tris[3-[2,2,3,3,4,4,4-heptafluoro-1-(oxo-βO)butyl]-1,7,7-trimethylbicyclo[2.2.1]heptan-2-onato-βO]- |

| CAS | Chemical Name |
|------------|---|
| 35397-13-8 | Propane, 1,1,1,2,2,3,3-heptafluoro-3-[(1,2,2-trifluoroethenyl)oxy]-, polymer with 1-chloro-1,2,2-trifluoroethene and ethene |
| 35560-16-8 | 1-Propene, 1,1,2,3,3,3-hexafluoro-, polymer with ethene and 1,1,2,2-tetrafluoroethene |
| 37486-69-4 | 3,6,9,12,15-Pentaoxaoctadecane, 1,1,1,2,4,4,5,7,7,8,10,10,11,13,13,14,16,16,17,17,18,18,18-tricosafuoro-5,8,11,14-tetrakis(trifluoromethyl)- |
| 37626-13-4 | Poly[4,5-difluoro-2,2-bis(trifluoromethyl)-1,3-dioxole-co-tetrafluoroethylene] |
| 38565-52-5 | Oxirane, 2-(2,2,3,3,4,4,5,5,6,6,7,7,7-tridecafluoroheptyl)- |
| 42532-60-5 | 2,3,3,3-Tetrafluoro-2-(trifluoromethyl)propanenitrile |
| 51798-33-5 | Poly[oxy(trifluoro(trifluoromethyl)-1,2-ethanediyl)], α-(1-carboxy-1,2,2,2-tetrafluoroethyl)-ω-[tetrafluoro(trifluoromethyl)ethoxy]- |
| 51851-37-7 | Silane, triethoxy(3,3,4,4,5,5,6,6,7,7,8,8,8-tridecafluorooctyl)- |
| 52591-27-2 | 2-Propenoic acid, 3,3,4,4,5,5,6,6,6-nonafluorohexyl ester |
| 53518-00-6 | 1-Propanaminium, N,N,N-trimethyl-3-[[[(1,1,2,2,3,3,4,4,4-nonafluorobutyl)sulfonyl]amino]-, chloride (1:1) |
| 54302-04-4 | Chlorotrifluoro ethylene, ethylene, hexafluoroisobutylene terpolymer |
| 54950-05-9 | Butanedioic acid, 2-sulfo-, 1,4-bis(3,3,4,4,5,5,6,6,7,7,8,8,8-tridecafluorooctyl) ester, sodium salt (1:1) |
| 55716-11-5 | Morpholine, 2,2,3,3,5,5,6,6-octafluoro-4-(1,1,2,2,2-pentafluoroethyl)- |
| 56357-87-0 | Ethene, 1,1,2,2-tetrafluoro-, polymer with 1,1-difluoroethene and 1,1,2-trifluoro-2-(trifluoromethoxy)ethene |
| 56467-05-1 | Poly(oxy-1,2-ethanediyl), α-(tridecafluoroethyl)-ω-hydroxy- |
| 57570-64-6 | 1-Propene, 1,1,2,3,3,3-hexafluoro-, polymer with 1,1-difluoroethene, 1,1,2,2-tetrafluoroethene and 1,1,2-trifluoro-2-(trifluoromethoxy)ethene |
| 58194-00-6 | Propanoyl fluoride, 2,3,3,3-tetrafluoro-2-[1,1,2,2,3,3-hexafluoro-3-(trifluoromethoxy)propoxy]- |
| 59587-38-1 | 6:2 Fluorotelomer sulfonate potassium salt (reportable under TRI as of 1/1/25) |
| 59587-39-2 | 6:2 Fluorotelomer sulfonate ammonium salt (reportable under TRI as of 1/1/25) |

| CAS | Chemical Name |
|------------|--|
| 60164-51-4 | Poly[oxy(trifluoro(trifluoromethyl)-1,2-ethanediyl)], α -(1,1,2,2,2-pentafluoroethyl)- ω -[tetrafluoro(trifluoromethyl)ethoxy]- |
| 63654-41-1 | 1-Propene, 1,1,2,3,3,3-hexafluoro-, polymer with 1,1,1,2,2,3,3-heptafluoro-3-[(1,2,2-trifluoroethenyl)oxy]propane and 1,1,2,2-tetrafluoroethene |
| 63863-43-4 | Propanoic acid, 3-[1-[difluoro[(1,2,2-trifluoroethenyl)oxy]methyl]-1,2,2,2-tetrafluoroethoxy]-2,2,3,3-tetrafluoro-, methyl ester |
| 63863-44-5 | Propanoic acid, 3-[1-[difluoro[(1,2,2-trifluoroethenyl)oxy]methyl]-1,2,2,2-tetrafluoroethoxy]-2,2,3,3-tetrafluoro-, methyl ester, polymer with 1,1,2,2-tetrafluoroethene |
| 65059-79-2 | 1-Butene, 4-bromo-3,3,4,4-tetrafluoro-, polymer with 1,1-difluoroethene, 1,1,2,2-tetrafluoroethene and 1,1,2-trifluoro-2-(trifluoromethoxy)ethene |
| 65208-35-7 | Poly[oxy(trifluoro(trifluoromethyl)-1,2-ethanediyl)], .alpha.-[1,2,2,2-tetrafluoro-1-(fluorocarbonyl)ethyl]-.omega.-[tetrafluoro(trifluoromethyl)ethoxy]- |
| 65530-82-7 | Poly(difluoromethylene), alpha,omega-difluoro- |
| 65530-85-0 | Poly(difluoromethylene), .alpha.-(cyclohexylmethyl)-.omega.-hydro- |
| 67584-51-4 | Glycine, N-ethyl-N-[(1,1,2,2,3,3,4,4,4-nonafluorobutyl)sulfonyl]-, potassium salt (1:1) |
| 67584-55-8 | 2-Propenoic acid, 2-[methyl[(1,1,2,2,3,3,4,4,4-nonafluorobutyl)sulfonyl]amino]ethyl ester |
| 67584-59-2 | 2-Propenoic acid, 2-methyl-, 2-[methyl[(1,1,2,2,3,3,4,4,4-nonafluorobutyl)sulfonyl]amino]ethyl ester |
| 67939-95-1 | 1-Propanaminium, N,N,N-trimethyl-3-[(1,1,2,2,3,3,4,4,4-nonafluorobutyl)sulfonyl]amino]-, iodide (1:1) |
| 68182-34-3 | 1-Propene, 1,1,2,3,3,3-hexafluoro-, polymer with 1,1-difluoroethene, 1,1,1,2,2,3,3-heptafluoro-3-[(1,2,2-trifluoroethenyl)oxy]propane and 1,1,2,2-tetrafluoroethene |
| 68258-85-5 | 1-Hexene, 3,3,4,4,5,5,6,6,6-nonafluoro-, polymer with ethene and 1,1,2,2-tetrafluoroethene |
| 68259-10-9 | 1-Butanesulfonic acid, 1,1,2,2,3,3,4,4,4-nonafluoro-, ammonium salt (1:1) |
| 68259-11-0 | Pentanoic acid, 2,2,3,3,4,4,5,5,5-nonafluoro-, ammonium salt (1:1) |
| 68298-12-4 | 1-Butanesulfonamide, 1,1,2,2,3,3,4,4,4-nonafluoro-N-methyl- |
| 68298-79-3 | Poly(oxy-1,2-ethanediyl), α -[2-[ethyl[(1,1,2,2,3,3,4,4,4-nonafluorobutyl)sulfonyl]amino]ethyl]- ω -hydroxy- |

| CAS | Chemical Name |
|-------------|---|
| 68310-18-9 | Poly[oxy(methyl-1,2-ethanediyl)], α-[2-[ethyl[(1,1,2,2,3,3,4,4,4-nonafluorobutyl)sulfonyl]amino]ethyl]-ω-hydroxy- |
| 68555-77-1 | 1-Butanesulfonamide, N-[3-(dimethylamino)propyl]-1,1,2,2,3,3,4,4,4-nonafluoro- |
| 68891-05-4 | Ethene, tetrafluoro-, homopolymer, α-fluoro-ω-(2-hydroxyethyl)-, citrate, reaction products with 1,6-diisocyanatohexane |
| 69087-47-4 | Propanoic acid, 3-[1-[difluoro[(1,2,2-trifluoroethenyl)oxy]methyl]-1,2,2,2-tetrafluoroethoxy]-2,2,3,3-tetrafluoro-, polymer with 1,1,2,2-tetrafluoroethene |
| 69116-73-0 | Propanoic acid, 3-[1-[difluoro[1,2,2,2-tetrafluoro-1-(fluorocarbonyl)ethoxy]methyl]-1,2,2,2-tetrafluoroethoxy]-2,2,3,3-tetrafluoro-, methyl ester |
| 69804-19-9 | Perfluoro(3-(1-(ethenyloxy)propan-2-yloxy)propanenitrile) |
| 69991-61-3 | Ethene, 1,1,2,2-tetrafluoro-, oxidized, polymd. |
| 69991-62-4 | Ethene, 1,1,2,2-tetrafluoro-, oxidized, polymd., reduced |
| 69991-67-9 | 1-Propene, 1,1,2,3,3,3-hexafluoro-, oxidized, polymd. |
| 70225-18-2 | 1-Butanesulfonic acid, 1,1,2,2,3,3,4,4,4-nonafluoro-, compd. with 2,2'-iminobis[ethanol] (1:1) |
| 71832-66-1 | Propanenitrile, 3-[1-[difluoro[(1,2,2-trifluoroethenyl)oxy]methyl]-1,2,2,2-tetrafluoroethoxy]-2,2,3,3-tetrafluoro-, polymer with 1,1,2,2-tetrafluoroethene and 1,1,2-trifluoro-2-(trifluoromethoxy)ethene |
| 74398-72-4 | 1-Butene, 4-bromo-3,3,4,4-tetrafluoro-, polymer with 1,1-difluoroethene, 1,1,2,3,3,3-hexafluoro-1-propene and 1,1,2,2-tetrafluoroethene |
| 74499-71-1 | 1-Propene, 1,1,2,3,3,3-hexafluoro-, polymer with ethene, 1,1,1,2,2,3,3-heptafluoro-3-[(1,2,2-trifluoroethenyl)oxy]propane and 1,1,2,2-tetrafluoroethene |
| 79070-11-4 | Poly(difluoromethylene), α-chloro-ω-(2,2-dichloro-1,1,2-trifluoroethyl)- |
| 86508-42-1 | Perfluoro compounds, C5-18 |
| 88645-29-8 | Ethene, 1,1,2,2-tetrafluoro-, oxidized, polymd., reduced, Me esters, reduced |
| 101316-90-9 | Ethene, 1,1,2,2-tetrafluoro-, oxidized, polymd., reduced, Me esters, reduced, acrylates |
| 125061-94-1 | Naphthalene, [difluoro(1,2,2,3,3,4,4,5,5,6,6-undecafluorocyclohexyl)methyl]heptadecafluorodecahydro- |
| 126066-30-6 | Poly[oxy(trifluoro(trifluoromethyl)-1,2-ethanediyl)], α-[1,2,2,2-tetrafluoro-1-(hydroxymethyl)ethyl]-ω-[tetrafluoro(trifluoromethyl)ethoxy]- |

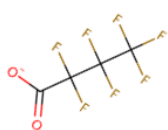
| CAS | Chemical Name |
|-------------|---|
| 132182-92-4 | Pentane, 1,1,1,2,2,3,3,4,4,5,5,5-decafluoro-3-methoxy-4-(trifluoromethyl)- |
| 134035-61-3 | Poly[oxy(trifluoro(trifluoromethyl)-1,2-ethanediyl)], α -[1,2,2,2-tetrafluoro-1-(methoxycarbonyl)ethyl]- ω -[tetrafluoro(trifluoromethyl)ethoxy]- |
| 147545-41-3 | 1-Butanesulfonamide, 1,1,2,2,3,3,4,4,4-nonafluoro-N-(2-hydroxyethyl)-N-methyl-, phosphate (ester) |
| 149935-01-3 | 1-Propene, 1,1,2,3,3,3-hexafluoro-, polymer with 1,1-difluoroethene, ethene, 1,1,2,2-tetrafluoroethene and 1,1,2-trifluoro-2-(trifluoromethoxy)ethene |
| 156559-18-1 | 2-Oxiranemethanol, polymers with reduced Me esters of reduced polymd. oxidized tetrafluoroethylene |
| 161075-12-3 | Ethene, tetrafluoro-, oxidized, polymd., reduced, Me esters |
| 162492-15-1 | Ethene, 1,1,2,2-tetrafluoro-, oxidized, polymd., reduced, Me esters, reduced, ethoxylated |
| 163702-05-4 | Butane, 1-ethoxy-1,1,2,2,3,3,4,4,4-nonafluoro- |
| 163702-06-5 | Propane, 2-(ethoxydifluoromethyl)-1,1,1,2,3,3,3-heptafluoro- |
| 163702-07-6 | Butane, 1,1,1,2,2,3,3,4,4-nonafluoro-4-methoxy- |
| 163702-08-7 | Propane, 2-(difluoromethoxymethyl)-1,1,1,2,3,3,3-heptafluoro- |
| 165178-32-5 | Propane, 1,1,1,2,2,3,3-heptafluoro-3-[(1,2,2-trifluoroethenyl)oxy]-, polymer with 1,1,2,2-tetrafluoroethene and 1,1,2-trifluoro-2-(trifluoromethoxy)ethene |
| 177484-43-4 | Propanenitrile, 2,3,3,3-tetrafluoro-2-[1,1,2,2,3,3-hexafluoro-3-[(1,2,2-trifluoroethenyl)oxy]propoxy]-, polymer with 1,1,2,2-tetrafluoroethene and 1,1,2-trifluoro-2-(trifluoromethoxy)ethene |
| 185701-88-6 | Propanoyl fluoride, 2,3,3,3-tetrafluoro-2-[1,1,2,3,3,3-hexafluoro-2-(1,1,2,2,3,3,3-heptafluoropropoxy)propoxy]-, polymer with 2,2,3-trifluoro-3-(trifluoromethyl)oxirane, reaction products with 3-(ethenyldimethylsilyl)-N-methylbenzenamine |
| 200013-65-6 | Diphosphoric acid, polymers with ethoxylated reduced Me esters of reduced polymd. oxidized tetrafluoroethylene |
| 212335-64-3 | 2-Propenoic acid, reaction products with N-[3-(dimethylamino)propyl]-1,1,2,2,3,3,4,4,4-nonafluoro-1-butanesulfonamide |
| 220075-01-4 | Propanedioic acid, 2-(3,3,4,4,5,5,6,6,7,7,8,8,8-tridecafluorooctyl)-, 1,3-dimethyl ester |
| 220182-27-4 | 1-Propene, 1,1,2,3,3,3-hexafluoro-, telomer with chlorotrifluoroethene, oxidized, reduced, Et ester, hydrolyzed |

| CAS | Chemical Name |
|-------------|--|
| 220459-70-1 | Glycine, N,N-bis[2-hydroxy-3-(2-propen-1-yloxy)propyl]-, sodium salt (1:1), reaction products with ammonium hydroxide and 1,1,1,2,2-pentafluoro-2-iodoethane-tetrafluoroethylene telomer |
| 220689-12-3 | Phosphonium, tetrabutyl-, 1,1,2,2,3,3,4,4,4-nonafluoro-1-butanesulfonate (1:1) |
| 226409-30-9 | Propanedioic acid, 2-(3,3,4,4,5,5,6,6,7,7,8,8,8-tridecafluorooctyl)-, 1,3-bis[4-(ethenyloxy)butyl] ester |
| 274917-93-0 | Ethene, tetrafluoro-, oxidized, polymd., reduced, decarboxylated, C3 fraction |
| 274917-94-1 | Ethene, tetrafluoro-, oxidized, polymd., reduced, decarboxylated, C4 fraction |
| 274917-95-2 | Ethene, tetrafluoro-, oxidized, polymd., reduced, decarboxylated, C5 fraction |
| 274917-96-3 | Ethene, tetrafluoro-, oxidized, polymd., reduced, decarboxylated, C6 fraction |
| 274917-97-4 | Ethene, tetrafluoro-, oxidized, polymd., reduced, decarboxylated, C7 fraction |
| 274918-01-3 | Ethene, tetrafluoro-, oxidized, polymd., reduced, decarboxylated, C8 fraction |
| 274918-02-4 | Ethene, tetrafluoro-, oxidized, polymd., reduced, decarboxylated, C9 fraction |
| 274918-03-5 | Ethene, tetrafluoro-, oxidized, polymd., reduced, decarboxylated, C10 fraction |
| 274918-09-1 | Ethene, tetrafluoro-, oxidized, polymd., reduced, decarboxylated, C11 fraction |
| 274918-10-4 | Ethene, tetrafluoro-, oxidized, polymd., reduced, decarboxylated, C12 fraction |
| 274918-12-6 | Ethene, tetrafluoro-, oxidized, polymd., reduced, decarboxylated, C13 fraction |
| 297730-93-9 | Hexane, 3-ethoxy-1,1,1,2,3,4,4,5,5,6,6,6-dodecafluoro-2-(trifluoromethyl)- |
| 328389-90-8 | 1,2-Propanediol, 3-(diethylamino)-, polymers with 5-isocyanato-1 |
| 332350-90-0 | Phosphonium, tributyl(2-methoxypropyl)-, salt with 1,1,2,2,3,3,4,4,4-nonafluoro-N-methyl-1-butanesulfonamide (1:1) |
| 332350-93-3 | Phosphonium, triphenyl(phenylmethyl)-, salt with 1,1,2,2,3,3,4,4,4-nonafluoro-N-methyl-1-butanesulfonamide (1:1) |
| 421595-49-5 | 2-Propenoic acid, 2-hydroxyethyl ester, adduct with 5-isocyanato-1-(isocyanatomethyl)-1,3,3-trimethylcyclohexane (1:1), reaction products with ethoxylated reduced Me esters of reduced polymd. oxidized tetrafluoroethylene |
| 425670-75-3 | 6:2 Fluorotelomer sulfonate anion (reportable under TRI as of 1/1/25) |
| 452080-67-0 | Boron, trifluoro(tetrahydrofuran)-, (T-4)-, polymer with 3-methyl |

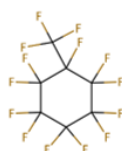
| CAS | Chemical Name |
|--------------|---|
| 475678-78-5 | Oxetane, 3-methyl-3-[[[(3,3,4,4,5,5,6,6,6-nonafluorohexyl)oxy]methyl]- |
| 484024-67-1 | 1-Butanesulfonamide, 1,1,2,2,3,3,4,4,4-nonafluoro-N-(2-hydroxyethyl)-, ammonium salt (1:1) |
| 502164-17-2 | Ethene, 1,1,2,2-tetrafluoro-, oxidized, polymd., reduced, Et esters |
| 753501-40-5 | Boron, trifluoro(tetrahydrofuran)-, (T-4)-, polymer with 3-methyl-3-[(|
| 753501-43-8 | Boron, trifluoro(tetrahydrofuran)-, (T-4)-, polymer with .alpha.-hy |
| 864910-70-3 | Boron, trifluoro(tetrahydrofuran)-, (T-4)-, polymer with 2-methy |
| 878545-84-7 | 1-Propene, 1,1,2,3,3,3-hexafluoro-, polymer with 1,1,2,2-tetrafluoroethene, 1,1,2-trifluoro-2-(1,1,2,2,2-pentafluoroethoxy)ethene and 1,1,2-trifluoro-2-(trifluoromethoxy)ethene |
| 957209-18-6 | Furan, 2,3,3,4,4-pentafluorotetrahydro-5-methoxy-2,5-bis[1,2,2,2-tetrafluoro-1-(trifluoromethyl)ethyl]- |
| 1224429-82-6 | Phosphoric acid, mixed esters with polyethylene glycol and 3,3,4,4,5,5,6,6,7,7,8,8,8-tridecafluoro-1-octanol, ammonium salts |
| 1370442-66-2 | Iodonium, diphenyl-, 4,4'-di-C10-13-alkyl derivs., (OC-6-11)-hexafluoroantimonates(1-) |
| 1092822-31-5 | 2-Propenoic acid, 2-methyl-, dodecyl ester, polymer with 2-hyd |
| 1269217-82-4 | Thieno[3,4-b]thiophene, homopolymer, 2-[1-[difluoro[(1,2,2-trifluoroethenyl)oxy]methyl]-1,2,2,2-tetrafluoroethoxy]-1,1,2,2-tetrafluoroethanesulfonic acid-tetrafluoroethylene polymer-doped |
| 1279108-20-1 | Hexane, 1,6-diisocyanato-, homopolymer, α-[1-[[[3-[[3-(dimethylamino)propyl]amino]propyl]amino]carbonyl]-1,2,2,2-tetrafluoroethyl]-ω-(1,1,2,2,3,3,3-heptafluoropropoxy)poly[oxy[trifluoro(trifluoromethyl)-1,2-ethanediyl]]-blocked |
| 1029089-63-1 | Boron, trifluoro(tetrahydrofuran)-, (T-4)-, polymer with 3-methyl-3-((2,2,3,3,3-pentafluoropropoxy)methyl)oxetane, ether with 2,2-dimethyl-1,3-propanediol (2:1), polymer with alpha-hydro-omega-hydroxypoly(oxy-1,2-ethanediyl) and 5-isocyanato-1-(isocyanatomethyl)-1,3,3-trimethylcyclohexane |
| 1033385-42-0 | Poly[oxy[trifluoro(trifluoromethyl)-1,2-ethanediyl]], α-[1,2,2,2-tetrafluoro-1-[[[2-hydroxyethyl]amino]carbonyl]ethyl]-ω-[tetrafluoro(trifluoromethyl)ethoxy]-, ether with α-hydro-ω-hydroxypoly(oxy-1,2-ethanediyl) (2:1) |
| 1214752-87-0 | Borate(1-), tetrahydro-, sodium (1:1), reaction products with reduced polymd. oxidized tetrafluoroethylene, hydrolyzed, diallyl ethers, polymers with 2,4,6,8- |

| CAS | Chemical Name |
|--------------|---|
| | tetramethylcyclotetrasiloxane, Si-(8,13-dioxo-4,7,12-trioxa-9-azapentadec-14-en-1-yl) derivs. |
| 1378928-76-7 | Ethanesulfonyl fluoride, 2-[1-[difluoro][(1,2,2-trifluoroethenyl)oxy]methyl]-1,2,2,2-tetrafluoroethoxy]-1,1,2,2-tetrafluoro-, polymer with 1,1,2,2-tetrafluoroethene, hydrolyzed, potassium salts |
| 1378930-04-1 | Ethanesulfonyl fluoride, 2-[1-[difluoro[(1,2,2-trifluoroethenyl)oxy]methyl]-1,2,2,2-tetrafluoroethoxy]-1,1,2,2-tetrafluoro-, polymer with 1,1,2,2-tetrafluoroethene, hydrolyzed |
| 1378930-30-3 | Propanoic acid, 3-[1-[difluoro[(1,2,2-trifluoroethenyl)oxy]methyl]-1,2,2,2-tetrafluoroethoxy]-2,2,3,3-tetrafluoro-, methyl ester, polymer with 1,1,2,2-tetrafluoroethene, hydrolyzed, potassium salts |
| 1564254-27-8 | Ethene, 1,1,2,2-tetrafluoro-, oxidized, polymd., reduced, Me esters, reduced, N-(3-isocyanatomethylphenyl)carbamates |
| 1627515-87-0 | Hexanedioic acid, polymers with 1,3-butanediol, 1,4-butanediol, di-Et malonate, 1,6-diisocyanatohexane, ethoxylated reduced Me esters of reduced polymd. oxidized tetrafluoroethylene, 1,6-hexanediol, 1,1'-methylenebis[isocyanatobenzene], propylene glycol a |
| 1687740-67-5 | Ethanesulfonyl fluoride, 1,1,2,2-tetrafluoro-2-[(1,2,2-trifluoroethenyl)oxy]-, polymer with 1,1,2,2-tetrafluoroethene, hydrolyzed, lithium salts |
| 1708962-18-8 | Methanol, reaction products with 1,1,1,2,2,3,4,4,5,5,6,6,7,7,7-tetradecafluoro-3-heptene |
| 1708962-19-9 | Methanol, reaction products with 1,1,1,2,3,4,4,5,5,6,6,7,7,7-tetradecafluoro-2-heptene |
| 1807944-82-6 | 1-Octanesulfonic acid, 3,3,4,4,5,5,6,6,7,7,8,8,8-tridecafluoro-, barium salt (2:1) |
| 3030471-22-5 | Acetic acid, [(γ-ω-perfluoro-C8-10-alkyl)thio] derivs., Bu esters (reportable under TRI as of 1/1/25) |
| NA | EFEP ethylene-tetrafluoroethylene-hexafluoropropylene terpolymer |
| 377-73-1 | Perfluoro-3-methoxypropanoic acid (reportable under TRI as of 1/1/25) |
| 3108-42-7 | Ammonium perfluorodecanoate (reportable under TRI as of 1/1/25) |
| 3830-45-3 | Sodium perfluorodecanoate (reportable under TRI as of 1/1/25) |
| 27619-94-9 | Fluorotelomer sulfonate sodium salt (reportable under TRI as of 1/1/25) |
| 27619-97-2 | Fluorotelomer sulfonate acid (reportable under TRI as of 1/1/25) |

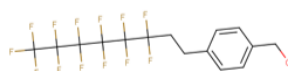
| CAS | Chemical Name |
|--------------|---|
| 59587-38-1 | Fluorotelomer sulfonate potassium salt (reportable under TRI as of 1/1/25) |
| 59587-39-2 | Fluorotelomer sulfonate ammonium salt (reportable under TRI as of 1/1/25) |
| 425670-75-3 | Fluorotelomer sulfonate anion (reportable under TRI as of 1/1/25) |
| 3030471-22-5 | Acetic acid, [(γ-ω-perfluoro-C8-10-alkyl)thio] derivs., Bu esters (reportable under TRI as of 1/1/25) |
| 82382-12-5 | Sodium perfluorohexanesulfonate (PFHxS-Na) (reportable under TRI as of 1/1/26) |



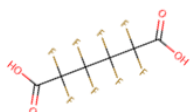
PFBA [375-22-4] three contiguous perfluorinated carbons



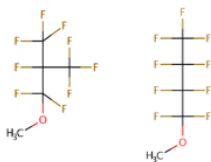
Perfluoromethylcyclohexane [355-02-2] cyclic perfluorinated ring



4-((Perfluorohexyl)ethyl)phenylmethanol [356055-76-0] six perfluorinated carbon alkyl chain with benzene ring as functional group

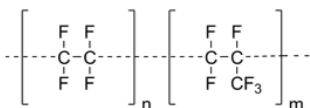


Perfluorohexanedioic acid [336-08-3] four perfluorinated carbon alkyl chain

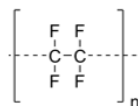


HFE (hydrofluoroether) 7100 [mixture of 163702-08-7 & 163702-07-6] each component has ≥ 3 perfluorinated carbon alkyl chain

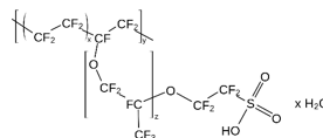
Examples of PFAS included in TURA Certain PFAS NOL Category



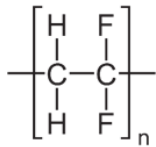
FEP Fluorinated ethylene propylene polymer [25067-11-2] polymer with repeating units that include 3 contiguous perfluorinated carbons



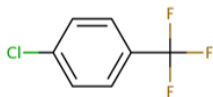
PTFE [9002-84-0] polymer - perfluorinated carbon repeating chain



Nafion [31175-20-9] tetrafluoroethylene copolymer with sulfonic acid side chains - ≥ 3 contiguous perfluorinated carbons

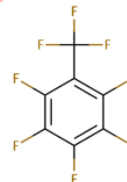


PVDF [24937-79-9]
 polyvinylidene fluoride -
 alternating perfluorinated and
 non-fluorinated carbons, <3
 contiguous perfluorinated
 carbons in polymer chain

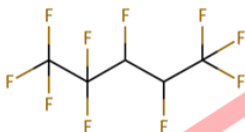


PCBTf [98-56-6]
 Parachlorobenzotrifluoride -
 only one perfluorinated carbon

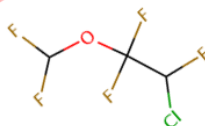
**Examples of PFAS NOT
 included in TURA Certain
 PFAS NOL Category**



Octafluorotoluene [434-64-0]
 only one perfluorinated carbon
 in alkyl chain. Fluorinated
 phenyl rings are not alkyl



HFC 4310mee [138495-42-8]
 2H,3H-Decafluoropentane
 has 3 perfluorinated carbons
 but not contiguous



Enflurane [13838-16-9] 2-chloro-1,1,2-
 trifluoroethyl difluoromethyl ether – is a
 fluorinated ether, but carbon on left of O is
 not perfluorinated (H bonded to C)

Guidance for TURA Reporting and Planning for Certain Metals and Metal Alloys

An alloy is a mixture of two or more metals or one or more metals and a nonmetal, as in carbon steel.

Effective reporting year 1995, the TURA Administrative Council delisted certain metals when present in a solid or molten alloy, but not including aerosols. The metals are:

Copper

Nickel

Chromium

Cobalt

Manganese

Effective beginning in reporting year 1998, the TURA Administrative Council delisted silver-copper mixture when present in an alloy form, but not in aerosols.

The established definition of an “alloy” requires that metals mixed with the primary metal must be intentionally added to improve its properties. A metallic substance that is pure or contains other metals as impurities is not considered an alloy. Consequently, the two Administrative Council delistings did not cover copper and silver that are pure or that contains small amounts of impurities described above.

Effective reporting year 1999, however, the Administrative Council delisted pure (i.e., zero valance) copper and pure silver (including forms containing impurities),but not including aerosols.

The delisting for all metals described above **DO NOT** extend to aerosols, dissolved metals, metal compounds, or metals that are not zero valance throughout the entire production process. Note that aerosols are metal particles that are less than 50 microns in diameter.

These metals have not been delisted from the EPCRATRI List. Although delisting by the TURA Administrative Council means that no Toxics Use Report need be submitted, the federal Form R is still required by EPA. The federal Form R submitted to MassDEP should be identified as “federal only.”

Guidance

Questions have been raised regarding implementation of these delistings. This guidance has been produced to assist the regulated community in complying with TURA. If you have any remaining questions after reading this document, please contact MassDEP for compliance assistance or the Office of Technical Assistance for further information.

The delisted metals are copper, nickel, chromium, cobalt, manganese and silver. Some of the processes in which those metals might be used are described below with specific guidance.

- ❑ Etching processes – When a metal is removed from metal stock through chemical processing, the resultant metal salt is reportable if it is produced in threshold quantities. (In this case, the metal salt is “coincidentally manufactured.”) The 25,000-pound threshold would apply if the metal salt were the only reportable chemical. It should be noted that the entire weight of the metal salt is considered when determining whether a threshold has been met, and not just the amount of the metal in the salt. As for the stock itself, any delisted metals contained in it are not reportable.
- ❑ Electropolishing operations - The metal salts in solution are reportable as “coincidentally manufactured” if they are produced in threshold quantities. Any delisted metals contained in the stock are not reportable.
- ❑ Grinding Operations - The delisted metals are not exempt from reporting when contained in aerosols, i.e., particles less than 50 microns in diameter (in this case, the metal is reported as “processed”). These metals are reportable if they are present in threshold quantities. When determining whether the reporting threshold has been exceeded, only the weight of the listed metal in the aerosol is considered, and not the total weight of the aerosol. Any delisted metals contained in the stock are not reportable.
- ❑ Multiple processes - In production units with multiple processes, certain individual processes may produce metal aerosols or metal salts in solution. Those aerosols and metal salts in solution would be reportable if produced in threshold quantities, as described above.
- ❑ Alloys in powdered form - If a metal is used in the powdered form, the facility will need to perform a particle size analysis to determine the amount of material less than 50 microns in size. If threshold quantities are produced, the metals are reportable if they are present in particles less than 50 microns in size. When determining whether the reporting threshold has been exceeded, only the weight of the listed metal is considered, and not the total weight of particles.

Note: MassDEP’s “Expanded Article” exemption is no longer applicable, since it applied to metals that have been delisted under TURA.

Difference in TRI and TURA Reporting of Hydrochloric Acid and Sulfuric Acid

- A qualifier was added to **hydrochloric acid (CAS No. 7647-01-0)** on the EPCRA list that relieves TRI reporting for non-aerosol forms, effective reporting year 1996. A similar qualifier was added for **sulfuric acid (CAS No. 7664-93-9)** effective reporting year 1995. TRI reporting only is required for acid aerosols including mists, gas, vapors, fog, and other airborne forms of any particle size. **This qualifier is only applicable to EPCRA Form Resubmissions.**
- Since this chemical is also on the CERCLA list, **all forms (both aerosol and non-aerosol) are reportable under TURA.** A “State-Only” Form R must be submitted with the Form S for these acids, in addition to the Form R submitted to EPA for only acid aerosols.
- For additional assistance on calculating and reporting sulfuric acid, please refer to the following EPA document: Sulfuric Acid: EPA-745-R-97-007 (11/97) Guidance for Reporting Sulfuric Acid (acid aerosols including mists, vapors, gas, fog and other forms of any particle size). This document is available from the EPA EPCRA Hotline 1-800-535-0202 and can be downloaded off the EPA TRI home page at <http://www.epa.gov/tri/>.

Rules for Reporting Glycol Ethers

There are separate categories for glycol ethers defined under EPCRA and CERCLA.

(Please refer to the TRI guidance document, "List of Toxic Chemicals within the Glycol Ethers Category and Guidance for Reporting," EPA 745-R-00-004.)

Reporting Guidance

EPCRA: Glycol Ethers are reportable as the glycol ethers category, (1022). The glycol ethers category is defined by the following formula:



where:

n = 1, 2, or 3;

R = Alkyl C7 or less, or phenyl or alkyl substituted phenyl;

R' = H or alkyl C7 or less, or

OR' consisting of a carboxylic acid ester, sulfate, phosphate, nitrate, or sulfonate.

Chemicals that meet this category definition are reportable.

Individually Listed Glycol Ethers

There are two chemicals, 2-methoxyethanol (CAS number 109-86-4) and 2-ethoxyethanol (CAS number 110-80-5) that are on the individual chemical list and CAS number list (40 CFR 372.65(a) and (b)). Threshold determinations should be made for each of these chemicals individually and separately from the glycol ethers category.

CERCLA: Glycol Ethers are reportable under CERCLA as defined by the following chemical formula:

Includes mono and di-ethers of ethylene glycol, diethylene glycol, and triethylene glycol $R-(OCH_2CH_2)_n-OR'$ where:

-n= 1, 2, or 3.

-R= alkyl or aryl groups.

-R'= R, H, or groups which, when removed, yield glycol ethers with the structure: $R-(OCH_2CH_2)_n-OH$.

Polymers are excluded from the glycol category.

Any glycol ether that meets the CERCLA definition only is reportable if it is specifically named on the TURA list. If glycol ether meets both the EPCRA and the CERCLA definitions, it is reportable under the EPCRA category (N230).

Rules for Reporting Specifically Listed Chemicals vs. Chemical Categories

The table below summarizes how to report chemicals that are specifically listed and/or listed as chemical categories. Descriptions of specific reporting requirements for each row follow the table.

| Row No. | EPCRA or TURA Specific Chemical | EPCRA or TURA Category | CERCLA Specific Chemical | CERCLA Category | TURA NOL Category | Report as: |
|---------|---------------------------------|------------------------|--------------------------|-----------------|-------------------|--------------------------|
| 7 | | Yes | | | Yes | EPCRA or TURA Category |
| 8 | | | Yes | | Yes | CERCLA Specific Chemical |
| 9 | | | Yes | Yes | | CERCLA Specific Chemical |
| 10 | | | | Yes | | Do Not Report |
| 11 | | | | Yes | Yes | TURA NOL category |
| 12 | | | | | Yes | TURA NOL category |

Rows 1, 2 & 3:

If a specific chemical is an EPCRA/TURA chemical and it also is reportable under either an EPCRA/TURA, CERCLA, or a TURA NOL listed category, it should be reported **only as a specific EPCRA/TURA chemical, and not under any of the categories.**

✓ Examples

EPCRA category (Compounds), EPCRA specifically listed
Report as: EPCRA specific chemical (Hydrogen Cyanide)

1,2,4 Trichlorobenzene: EPCRA specifically listed, CERCLA category (Chlorinated Benzenes)
Report as: EPCRA specific chemical (1,2,4 Trichlorobenzene)

Chloroform: EPCRA specifically listed chemical, TURA NOL Category (C1-C4)
Report as: EPCRA specific chemical (Chloroform)

Row 4:

Chemicals falling under an EPCRA or TURA chemical category or categories that are not specifically listed under EPCRA, TURA or CERCLA should be reported under the EPCRA chemical category or categories.

✓ Example: Silver Nitrate, Reporting Two Competing Compound Classes

If you are reporting Silver Nitrate, you need to report under both the Silver Compounds and Nitrate Compounds categories.

* **Report the SAME weight for Silver Compounds and Nitrate Compounds use (total weight of the compound) on EACH Form S.**

* For Byproduct and Shipped in Product tracking, report ONLY the weight of the reportable constituent for each category.

* In Section 2 of each Form S, enter the weight of the chemical compound that is not the reportable constituent in d.

* Even though two separate Form S's will be filed for Silver Compounds and Nitrate Compounds, **only ONE TURA fee for both chemicals is paid.** (Example Form S's are shown below for a facility that processes 26,000 pounds of silver nitrate and generates 1,000 pounds of silver nitrate byproduct.)

✓ Form S Example:

Section 1: Facility-Wide Use of Listed Chemical

| | |
|--|--|
| 1037 | Silver Compounds |
| a. CAS # | b. Chemical Name (Dioxin should be in grams, decimal points may be used) |
| Facility-wide use of chemical identified in a. Enter the total amount (in POUNDS, except for dioxin) for each applicable category. NOTE: "Generated as byproduct" (item f.) means all waste containing the listed chemical before the waste is handled, transferred, treated, recycled or released. Please refer to the reporting instructions before completing this section. | |
| | 26,000 |
| c. Manufactured | d. Processed |
| | 635 |
| e. Otherwise used | f. Generated as Byproduct |
| 15,875 | 1.05 |
| g. Shipped in or as product | h. Production or Activity Ratio |

Section 2: Materials Balance

When the amounts reported in c, d and e in Section 1 are added together, the sum will in many cases equal the sum of f and g. In other words, lines c, d and e will often form a "materials balance." If lines c, d and e are not in approximate balance, you must use this section to explain why. Indicate all the reasons that apply by entering the number of pounds on the appropriate line below (e.g., 4,000 Chemical was held in inventory).

| | |
|-----------------------------------|---|
| a. Chemical was recycled on site | b. Chemical was consumed or transformed |
| c. Chemical was held in inventory | 9,490 d. Chemical is a compound |
| e. Other (explain below) | |

f. Did anything non-routine occur at your facility during the reporting year which affected the data reported?
 Yes* No *If your answer is Yes, you may explain in Section 4.I. on Page 3.

Section 1: Facility-Wide Use of Listed Chemical

| | |
|------------------|---|
| 1090 a. CAS # | Nitrate Compounds b. Chemical Name (Dioxin should be in grams, decimal points may be used) |
|------------------|---|

Facility-wide use of chemical identified in a. Enter the total amount (in POUNDS, except for dioxin) for each applicable category. **NOTE:** 'Generated as byproduct' (item f.) generally means all waste containing the listed chemical before the waste is handled, transferred, treated, recycled or released. Please refer to the reporting instructions before completing this section.

| | |
|--------------------------------------|---|
| c. Manufactured | 26,000 d. Processed |
| e. Otherwise used | 365 f. Generated as Byproduct |
| 9,125 g. Shipped in or as Product | 1.05 h. Production or Activity Ratio |

Section 2: Materials Balance

When the amounts reported in c, d and e in Section 1 are added together, the sum will in many cases equal the sum of f and g. In other words, lines c, d and e will often form a "materials balance." If lines c, d and e are not in approximate balance, you must use this section to explain why. Indicate all the reasons that apply by entering the number of pounds on the appropriate line below (e.g., 4,000 Chemical was held in inventory).

a. Chemical was recycled on site

b. Chemical was consumed or transformed

c. Chemical was held in inventory

15,510

d. Chemical is a compound

e. Other (explain below)

f. Did anything non-routine occur at your facility during the reporting year which affected the data reported?

Yes* No *If your answer is Yes, you may explain in

Row 5:

Chemicals falling under an EPCRA or TURA chemical category and a CERCLA chemical category that are not specifically listed under EPCRA, TURA, or CERCLA should be reported under the EPCRA or TURA chemical category.

Row 6:

Chemicals falling under an EPCRA or TURA chemical category and are specifically listed under CERCLA, should be reported under the EPCRA or TURA chemical category.

Row 8:

If a specific chemical is a CERCLA chemical and it also is reportable under a TURA NOL listed category, it should be reported **only as a specific CERCLA chemical, and not under the TURA NOL category.**

✓ Example

1,1-Dichloropropane (CAS 78-99-9): CERCLA specifically listed, TURA NOL Category (C1-C4 halogenated hydrocarbons/halocarbons NOL).

Report as: CERCLA specific chemical (1,1-Dichloropropane).

Row 9:

When a specifically listed CERCLA chemical falls within a CERCLA listed category, it should be reported **only as the specific CERCLA chemical**.

✓ Example

Benzenesulfonyl Chloride: CERCLA specifically listed, CERCLA category (Chlorinated Benzenes)

Report as: CERCLA specific chemical (Benzenesulfonyl Chloride)

Row 10:

Chemicals that only are listed as a CERCLA category are not reportable.

CERCLA Category only: phthalate esters, polynuclear aromatic hydrocarbons, polycyclic organic matter, glycol ethers, chlorinated phenols, etc. should NOT be reported unless they are specifically named.

Row 11:

Chemicals falling under a CERCLA category and a TURA NOL category should be reported under the TURA NOL chemical category.

✓ Example

Haloethers is a CERCLA category, and there are haloethers that are also part of the Certain PFAS NOL category. If you use a haloether that is part of the Certain PFAS NOL category, report it under that category.

Row 12:

Chemicals falling under a TURA NOL chemical category or categories that are not specifically listed under EPCRA, TURA or CERCLA, and are not part of an EPCRA/TURA category, should be reported under the TURA NOL chemical category or categories.

✓ Example Reporting Two Competing Compound Classes

Propane, 1,1,1,2,2,3,3,3-octafluoro- (CAS 76-19-7): This chemical is reportable under both the C1-C4 DEP Category (**1047**) and the Certain PFAS NOL Category (**1300**).

Report the SAME weight for the C1-C4 NOL category and the Certain PFAS NOL category use on EACH Form S.

Even though two separate Form S's will be filed for the C1-C4 NOL category and Certain PFAS NOL category, **only ONE TURA fee for both categories is paid**. (See the examples on the following page for processing 30,000 lb. of a chemical in both categories with no generation of byproduct.)

Chemical Category Definitions

TURA requires reporting on many chemical categories. The individual chemicals included in each chemical category should always be reported in their parent chemical category (e.g., antimony compounds), and not as individual chemicals. Below is guidance on which individual chemicals are included in some of the reportable chemical categories. Please note that this is not an exhaustive list of reportable chemical categories or of individual chemicals within the chemical categories listed below.

1000 Antimony Compounds

Includes any unique chemical substance that contains antimony as part of the chemical's infrastructure. Includes, but is not limited to:

| CAS | Chemical Name |
|------------|-----------------------------|
| 1309-64-4 | Antimony Trioxide |
| 7647-18-9 | Antimony Pentachloride |
| 7783-56-4 | Antimony Trifluoride |
| 7789-61-9 | Antimony Tribromide |
| 10025-91-9 | Antimony Trichloride |
| 28300-74-5 | Antimony Potassium Tartrate |

1001 Arsenic Compounds

Includes any unique chemical substance that contains arsenic as part of the chemical's infrastructure. Includes, but is not limited to:

| CAS | Chemical Name |
|-----------|----------------------|
| 692-42-2 | Diethylarsine |
| 696-28-6 | Dichlorophenylarsine |
| 1303-28-2 | Arsenic Pentoxide |
| 1303-32-8 | Arsenic Disulfide |
| 1303-33-9 | Arsenic Trisulfide |
| 1327-52-2 | Arsenic Acid |
| 1327-53-3 | Arsenic Trioxide |
| 7631-89-2 | Sodium Arsenate |

| CAS | Chemical Name |
|------------|----------------------|
| 7645-25-2 | Lead Arsenate |
| 7778-39-4 | Arsenic Acid |
| 7778-44-1 | Calcium Arsenate |
| 7784-34-1 | Arsenous Trichloride |
| 7784-40-9 | Lead Arsenate |
| 7784-41-0 | Potassium Arsenate |
| 7784-46-5 | Sodium Arsenite |
| 10102-48-4 | Lead Arsenate |
| 10124-50-2 | Potassium Arsenate |
| 52740-16-6 | Calcium Arsenate |

1002 Barium Compounds

Includes any unique chemical substance that contains barium as part of the chemical's infrastructure. Does not include barium sulfate, CAS # 7727-43-7. Includes, but is not limited to

| CAS | Chemical Name |
|----------|----------------|
| 542-62-1 | Barium Cyanide |

1003 Beryllium Compounds

Includes any unique chemical substance that contains beryllium as part of the chemical's infrastructure. Includes, but is not limited to:

| CAS | Chemical Name |
|------------|--------------------|
| 7787-47-5 | Beryllium Chloride |
| 7787-49-7 | Beryllium Fluoride |
| 7787-55-5 | Beryllium Nitrate |
| 13597-99-4 | Beryllium Nitrate |

1004 Cadmium Compounds

Includes any unique chemical substance that contains cadmium as part of the chemical's infrastructure.
Includes, but is not limited to:

| CAS | Chemical Name |
|------------|------------------|
| 543-90-8 | Cadmium Acetate |
| 7789-42-6 | Cadmium Bromide |
| 10108-64-2 | Cadmium Chloride |

1009 Chlorophenols

Please see EPA TRI reporting instructions. Includes, but is not limited to:

| CAS | Chemical Name |
|------------|---------------------------|
| 58-90-2 | 2,3,4,6-Tetrachlorophenol |
| 87-65-0 | 2,6 Dichlorophenol |
| 95-57-8 | 2-Chlorophenol |
| 609-19-8 | 3,4,5 Trichlorophenol |
| 933-75-5 | 2,3,6 Trichlorophenol |
| 933-78-8 | 2,3,5 Trichlorophenol |
| 5344-82-1 | 2-Chlorophenolthiourea |
| 7005-72-3 | Chlorophenyl Phenyl Ether |
| 15950-66-0 | 2,3,4 trichlorophenol |
| 25167-82-2 | Trichlorophenol |

1216 Cr(VI) Chromium Compounds

Hexavalent Chromium Compounds. Please refer to guidance on reporting Hexavalent Chromium Compounds in Appendix B. This list includes, but is not limited to the following compounds:

| CAS | Chemical Name |
|-----------|--|
| 7788-98-9 | (NH ₄) ₂ CrO ₄ Ammonium Chromate |
| 7789-09-5 | (NH ₄) ₂ Cr ₂ O ₇ Ammonium Dichromate |

| CAS | Chemical Name |
|---------------------------|--|
| 10294-40-3 | BaCrO ₄ Barium Chromate |
| 1189-85-1 | [(CH ₃) ₃ CO] ₂ CrO ₂ tert-Butyl Chromate |
| 13765-19-0 | CaCrO ₄ Calcium Chromate |
| 7738-94-5 | H ₂ CrO ₄ Chromic Acid |
| 14986-48-2 | CrCl ₆ Chromium VI Chloride |
| 1333-82-0 | CrO ₃ Chromic Trioxide |
| 18540-29-9 | Cr ⁶⁺ Hexavalent Chromium Ion |
| 7758-97-6 | PbCrO ₄ Lead Chromate |
| 8454-12-1 | PbCrO ₄ ·PbO Lead Chromate Oxide |
| 16037-50-6 | KCrO ₃ Cl Potassium Chlorochromate |
| 7789-00-6 | K ₂ CrO ₄ Potassium Chromate |
| 7778-50-9 | K ₂ Cr ₂ O ₇ Potassium Dichromate |
| 7784-01-2 | Ag ₂ CrO ₄ Silver Chromate |
| 7775-11-3 or 2146-10-8 | Na ₂ CrO ₄ Sodium Chromate |
| 7789-12-0 | Na ₂ Cr ₂ O ₇ · 2H ₂ O Sodium Dichromate Dihydrate |
| 10588-01-9 | Na ₂ Cr ₂ O ₇ Sodium Dichromate |
| 7789-06-2 or 2151-06-8 | SrCrO ₄ Strontium Chromate |
| 13530-65-9 | ZnCrO ₄ Zinc Chromate |
| 14018-95-2 | ZnCr ₂ O ₇ Zinc Dichromate |
| 1066-30-4 | Chromic Acetate |

1217 Non Cr(VI) Chromium Compounds

Non-Hexavalent Chromium Compounds. Includes, but is not limited to*:

*Note: (trivalent) Chromic Oxide, CAS# 1308-38-9 (Cr₂O₃) was delisted from TURA in 1995.

| CAS | Chemical Name |
|------------|-------------------|
| 10101-53-8 | Chromic Sulfate |
| 1308-31-2 | Chromite |
| 10049-05-5 | Chromous Chloride |
| 7788-97-8 | Chromous Fluoride |
| 544-18-3 | Cobaltous Formate |

1013 Cobalt Compounds

Includes any unique chemical substance that contains cobalt as part of the chemical's infrastructure.
Includes, but is not limited to:

| CAS | Chemical Name |
|------------|--|
| 7789-43-7 | Cobaltous Bromide |
| 14017-41-5 | Cobaltous Sulfamate |
| 137-29-1 | Copper, bis(dimethylcarbamodithioato-s-s)- |

1015 Copper Compounds

Includes any unique chemical substance that contains copper as part of the chemical's infrastructure.
Does not include copper phthalocyanine compounds that are substituted with only hydrogen, and/or chlorine, and/or bromine. Includes, but is not limited to:

| CAS | Chemical Name |
|------------|----------------------------|
| 544-92-3 | Copper Cyanide |
| 815-82-7 | Cupric Tartrate |
| 3251-23-8 | Cupric Nitrate |
| 5893-66-3 | Cupric Oxalate |
| 7447-39-4 | Cupric Chloride |
| 7758-98-7 | Cupric Sulfate |
| 10380-29-7 | Cupric Sulfate, Ammoniated |
| 57-12-5 | Cyanides |

1016 Cyanide Compounds

X⁺CN⁻ where X = H⁺ or any other group where a formal dissociation may occur. For example: KCN or CA(Cn)₂. Includes, but is not limited to:

| CAS | Chemical Name |
|-----------|--|
| 143-33-9 | Sodium Cyanide |
| 151-50-8 | Potassium Cyanide |
| 460-19-5 | Cyanogen |
| 506-61-6 | Potassium Silver Cyanide |
| 506-64-9 | Silver Cyanide |
| 506-68-3 | Cyanogen Bromide |
| 506-77-4 | Cyanogen Chloride |
| 542-62-1 | Barium Cyanide |
| 544-92-3 | Copper Cyanide |
| 557-19-7 | Nickel Cyanide |
| 557-21-1 | Zinc Cyanide |
| 592-01-8 | Calcium Cyanide |
| 592-04-1 | Mercuric Cyanide |
| 592-85-8 | Mercuric Thiocyanate |
| 592-87-0 | Lead Thiocyanate |
| 1762-95-4 | Ammonium Thiocyanate |
| 91-93-0 | 3,3'-Dimethoxybenzidine-4,4' di-isocyanate |

1050 Diisocyanates

Includes only the chemicals listed here.

| CAS | Chemical Name |
|----------|---|
| 91-97-4 | 3-3'-Dimethyl-4,4'-diphenylene diisocyanate |
| 101-68-8 | Methylenebis(phenylisocyanate)(MDI) (previously reportable under EPCRA) |

| CAS | Chemical Name |
|-------------|---|
| 104-49-4 | 1,4 Phenylene diisocyanate |
| 123-61-5 | 1,3-Phenylene diisocyanate |
| 139-25-3 | 3-3' Dimethyl diphenylmethane-4-4' diisocyanate |
| 822-06-0 | Hexamethylene 1,6 -diisocyanate |
| 2556-36-7 | 1,4 Cyclohexane diisocyanate |
| 3173-72-6 | 1,5 Naphthalene diisocyanate |
| 4098-71-9 | Isophorone diisocyanate |
| 4128-73-8 | 4,4'-diisocyanatodiphenylether |
| 5124-30-1 | 1,1-Methylene bis(4-isocyanato-cyclohexane |
| 9016-87-9 | Polmeric diphenylmethane diisocyanate |
| 10347-54-3 | 1,4-Bis(methylisocyanate)cyclohexane |
| 15646-96-5 | 2,4,4-Trimethylhexamethylene di-isocyanate |
| 16938-22-0 | 2,2,4-Trimethylhexamethylene diisocyanate |
| 38661-72-2 | 1,3-Bis(methylisocyanate)cyclo-hexane |
| 75790-84-0 | 4-Methyldiphenylmethane-3,4-diisocyanate |
| 75790-87-3 | 2,4'-Diisocyanatodiphenyl sulfide |
| 134190-37-7 | Diethyldiisocyanatobenzene |
| 1746-01-6 | 2,3,7,8- Tetrachlorodibenzo-p-dioxin |

1048 Diisononyl phthalate (DINP)

Includes branched alkyl di-esters of 1,2 benzenedicarboxylic acid in which alkyl ester moieties contain a total of nine carbons. This category includes but is not limited to the chemicals listed here.

| CAS | Chemical Name |
|------------|-------------------------------------|
| 14103-61-8 | Bis(3,5,5-trimethylhexyl) phthalate |
| 20548-62-3 | Bis(7-methyloctyl) phthalate |
| 28553-12-0 | Diisononyl phthalate |

| CAS | Chemical Name |
|-------------|---|
| 71549-78-5 | Branched dinonyl phthalate |
| 68515-48-0 | Di(C8-10, C9 rich), branched alkyl phthalates |
| 111983-10-9 | Bis(3-ethylheptan-2-yl) benzene-1,2-dicarboxylate |

1060 Dioxin & Dioxin-Like Compounds

Manufacturing; and the processing or otherwise use of dioxin or dioxin-like compounds if the dioxin and dioxin-like compounds are present as contaminants in a chemical and if they were created during the manufacture of that chemical. Includes only the chemicals listed here.

| CAS | Chemical Name |
|------------|---|
| 3268-87-92 | 1,2,3,4,6,7,8,9- Octachlorodibenzo-p-dioxin |
| 19408-74-3 | 1,2,3,7,8,9- Hexachlorodibenzo-p-dioxin |
| 35822-46-9 | 1,2,3,4,6,7,8- Heptachlorodibenzo-p-dioxin |
| 39001-02-0 | 1,2,3,4,6,7,8,9- Octachlorodibenzofuran |
| 39227-28-6 | 1,2,3,4,7,8-- Hexachlorodibenzo-p-dioxin |
| 40321-76-4 | 1,2,3,7,8-- Pentachlorodibenzo-p-dioxin |
| 51207-31-9 | 2,3,7,8- Tetrachlorodibenzofuran |
| 55673-89-7 | 1,2,3,4,7,8,9- Heptachlorodibenzofuran |
| 57117-31-4 | 2,3,4,7,8- Pentachlorodibenzofuran |
| 57117-41-6 | 1,2,3,7,8- Pentachlorodibenzofuran |
| 57117-44-9 | 1,2,3,6,7,8- Hexachlorodibenzofuran |
| 57653-85-7 | 1,2,3,6,7,8- Hexachlorodibenzo-p-dioxin |
| 60851-34-5 | 2,3,4,6,7,8- Hexachlorodibenzofuran |
| 67562-39-4 | 1,2,3,4,6,7,8- Heptachlorodibenzofuran |
| 70648-26-9 | 1,2,3,4,7,8- Hexachlorod-benzofuran |
| 72918-21-9 | 1,2,3,7,8,9- Hexachlorodibenzofuran |

Ethylenebisdithiocarbamic acid, salts, esters

Includes any unique chemical substance that contains an EBDC or an EBDC salt as part of that chemical's infrastructure. Includes, but is not limited to:

| CAS | Chemical Name |
|----------|---|
| 111-54-6 | Ethylenebisdithiocarbamic acid, salts, esters |

1022 Certain Glycol Ethers

Please see guidance on Glycol Ethers in Appendix B

| CAS | Chemical Name |
|-----------|-------------------------------------|
| 3194-55-6 | 1,2,5,6,9,10-hexabromocyclododecane |

1047 Halogenated Compounds NOL (C1-C4)

Please see guidance on reporting

C1-C4 Halogenated Hydrocarbons/Halocarbons Not Otherwis Listed in Appendix B

| CAS | Chemical List |
|----------|-------------------------|
| 74-96-4 | Bromoethane |
| 74-97-5 | Methane, bromochloro- |
| 75-03-6 | Iodoethane |
| 75-10-5 | Methane, difluoro- |
| 75-26-3 | 2-bromopropane |
| 75-37-6 | 1,1-Difluoroethane |
| 75-38-7 | 1,1-Difluoroethene |
| 75-46-7 | Methane, trifluoro- |
| 75-73-0 | Carbon tetrafluoride |
| 76-16-4 | Ethane, hexafluoro- |
| 76-19-7 | Octafluoropropane |
| 79-38-9 | Chlorotrifluoroethylene |
| 106-95-6 | Allyl bromide |

| CAS | Chemical List |
|----------|---|
| 107-04-0 | Ethane, 1-bromo-2-chloro- |
| 109-65-9 | Butane, 1-bromo- |
| 109-70-6 | Propane, 1-bromo-3-chloro- |
| 115-25-3 | Octafluorocyclobutane (Perfluorocyclobutane) |
| 116-15-4 | 1,1,2,3,3,3-Hexafluoro-1-propene |
| 354-33-6 | Pentafluoroethane |
| 354-58-5 | 1,1,1-Trichlorotrifluoroethane |
| 354-64-3 | Pentafluoroethyl iodide |
| 359-07-9 | Ethane, 2-bromo-1,1-difluoro- |
| 359-35-3 | 1,1,2,2-tetrafluoroethane |
| 374-07-2 | 1,1-Dichlorotetrafluoroethane |
| 382-10-5 | 1-Propene, 3,3,3-trifluoro-2-(trifluoromethyl)- |
| 406-58-6 | 1,1,1,3,3-Pentafluorobutane |
| 420-46-2 | 1,1,1-Trifluoroethane |
| 420-46-2 | 1,1,1-Trifluoroethane |
| 423-39-2 | Perfluorobutyl iodide |
| 431-31-2 | 1,1,1,2,3-Pentafluoropropane |
| 431-89-0 | 1,1,1,2,3,3,3-Heptafluoropropane |
| 460-73-1 | 1,1,1,3,3-Pentafluoropropane |
| 507-20-0 | 2-chloro-2-methylpropane |
| 557-91-5 | 1,1-Dibromoethane |
| 677-21-4 | 1-Propene, 3,3,3-trifluoro- |
| 690-39-1 | 1,1,1,3,3,3-Hexafluoropropane |
| 754-12-1 | 2,3,3,3-Tetrafluoropropene |
| 811-97-2 | 1,1,1,2-Tetrafluoroethane |

| CAS | Chemical List |
|-------------|---|
| 5408-86-6 | Butane, 2,3-dibromo- |
| 29118-24-9 | 1,3,3,3-Tetrafluoropropene |
| 102687-65-0 | 1-Chloro-3,3,3-trifluoropropene |
| 75-11-6 | Methane, diiodo- |
| 75-47-8 | Methane, triiodo- |
| 75-61-6 | Dibromodifluoromethane |
| 75-82-1 | 1,2-Dibromo-1,1-difluoroethane |
| 76-11-9 | 1,1,1,2-Tetrachloro-2,2-difluoroethane |
| 76-12-0 | 1,1,2,2-Tetrachloro-1,2-difluoroethane |
| 76-18-6 | 2-Chloro-1,1,1,2,3,3,3-heptafluoropropane |
| 78-74-0 | Ethane, 1,1,2-tribromo- |
| 78-75-1 | 1,2-Dibromopropane |
| 79-27-6 | 1,1,2,2-Tetrabromoethane |
| 79-28-7 | Ethene, tetrabromo- |
| 79-35-6 | 1,1-Dichloro-2,2-difluoroethylene |
| 96-11-7 | 1,2,3-Tribromopropane |
| 109-64-8 | 1,3-Dibromopropane |
| 124-72-1 | Teflurane |
| 156-59-2 | cis-1,2-Dichloroethylene |
| 306-80-9 | Fluorotetrabromoethane |
| 338-75-0 | 2,3-Dichloro-1,1,1-trifluoropropane |
| 353-36-6 | Ethane, fluoro- |
| 353-54-8 | Methane, tribromofluoro- |
| 353-83-3 | 1,1,1-Trifluoro-2-iodoethane |
| 354-04-1 | Ethane, 1,2-dibromo-1,1,2-trifluoro- |

| CAS | Chemical List |
|----------|---|
| 354-12-1 | 1,1,1-Trichloro-2,2-difluoroethane |
| 354-15-4 | 1,1,2-Trichloro-1,2-difluoroethane |
| 354-21-2 | 1,1,2-Trichloro-2,2-difluoroethane |
| 354-48-3 | 1,1,1-Tribromo-2,2,2-trifluoroethane |
| 354-55-2 | Bromopentafluoroethane |
| 354-56-3 | Pentachlorofluoroethane |
| 354-92-7 | Propane, 1,1,1,2,3,3,3-heptafluoro-2-(trifluoromethyl)- |
| 355-20-4 | Butane, 2,3-dichloro-1,1,1,2,3,4,4,4-octafluoro- |
| 355-24-8 | Butane, 1,4-dichloro-1,1,2,2,3,3,4,4-octafluoro- |
| 355-25-9 | Decafluorobutane (Perfluorobutane) |
| 356-18-3 | Dichlorohexafluorocyclo Butane |
| 358-97-4 | 1,2-Dibromo-1-fluoroethane |
| 359-11-5 | Ethene, trifluoro- |
| 359-28-4 | 1,1,2-Trichloro-2-fluoroethane |
| 359-58-0 | 1-Chloro-1,1,2,3,3,3-hexafluoropropane |
| 360-86-1 | 2-Butene, 1,3-dichloro-1,1,2,4,4,4-hexafluoro- |
| 360-88-3 | 2-Butene, 1,4-dichloro-1,1,2,3,4,4-hexafluoro- |
| 360-89-4 | 2-Butene, 1,1,1,2,3,4,4,4-octafluoro- |
| 375-17-7 | 1,1,1,2,2,3,3,4,4-Nonafluorobutane |
| 375-50-8 | Butane, 1,1,2,2,3,3,4,4-octafluoro-1,4-diiodo- |
| 377-36-6 | Butane, 1,1,2,2,3,3,4,4-octafluoro- |
| 377-41-3 | Chloroheptafluorocyclo butane |
| 382-21-8 | Perfluoroisobutylene |
| 407-81-8 | 2-Butene, 1,4-difluoro- |

| CAS | Chemical List |
|----------|--|
| 420-44-0 | 2-Chloro-2-fluoropropane |
| 420-45-1 | Propane, 2,2-difluoro- |
| 420-99-5 | 1-Chloro-2,2-difluoropropane |
| 421-04-5 | 1-Chloro-1,1,2-Trifluoroethane |
| 421-07-8 | Propane, 1,1,1-trifluoro- |
| 421-73-8 | 2-Chloro-1,1,1,2-tetrafluoropropane |
| 421-75-0 | 1-Chloro-1,1,2,2-tetrafluoropropane |
| 421-99-8 | 1,1,3-Trichloro-1,2,2-trifluoropropane |
| 422-00-5 | 1,3-Dichloro-1,1,2,2-tetrafluoropropane |
| 422-02-6 | 3-Chloro-1,1,1,2,3-pentafluoropropane |
| 422-26-4 | 1,1,1,2,2,3-Hexachloro-3-fluoropropane |
| 422-49-1 | 1,1,1,3,3-Pentachloro-2,2-difluoropropane |
| 422-50-4 | 1,1,1,3-Tetrachloro-2,2,3-trifluoropropane |
| 422-51-5 | 1,1,1-Trichloro-2,2,3,3-tetrafluoropropane |
| 422-52-6 | 1,1,3,3-Tetrachloro-1,2,2-trifluoropropane |
| 422-53-7 | 1,1,3-Trichloro-1,2,2,3-tetrafluoropropane |
| 422-54-8 | 1,3,3-Trichloro-1,1,2,2-tetrafluoropropane |
| 422-55-9 | 1-Chloro-1,1,2,2,3,3-hexafluoropropane |
| 422-57-1 | 3-Chloro-1,1,1,2,2,3-hexafluoropropane |
| 422-78-6 | 1,1,1,2,2,3,3-Heptachloro-3-fluoropropane |
| 422-79-7 | Propane, dibromopentafluoro- |
| 422-86-6 | 1-Chloro-1,1,2,2,3,3,3-heptafluoropropane |
| 425-94-5 | 1,2-Dichloro-1,2,3,3-tetrafluoropropane |
| 430-53-5 | 1,1-Dichloro-2-fluoroethane |
| 430-57-9 | 1,2-Dichloro-1-fluoroethane |

| CAS | Chemical List |
|----------|--|
| 430-66-0 | Ethane, 1,1,2-trifluoro- |
| 431-07-2 | 1-Chloro-1,2,2-Trifluoroethane |
| 431-63-0 | 1,1,1,2,3,3-Hexafluoropropane |
| 431-87-8 | 2-Chloro-1,1,1,3,3,3-hexafluoropropane |
| 462-39-5 | Propane, 1,3-difluoro- |
| 471-43-2 | 1,1-Dichloro-2,2-difluoroethane |
| 507-25-5 | Methane, tetraiodo- |
| 513-31-5 | 2,3-Dibromopropene |
| 513-92-8 | Ethene, tetraiodo- |
| 540-49-8 | 1,2-Dibromoethylene |
| 540-54-5 | 1-Chloropropane |
| 556-56-9 | Allyl iodide |
| 558-13-4 | Tetrabromomethane |
| 590-11-4 | cis-Dibromoethylene |
| 590-12-5 | trans-1,2-Dibromoethylene |
| 593-53-3 | Methyl fluoride |
| 593-66-8 | Ethene, iodo- |
| 593-70-4 | Chlorofluoromethane |
| 593-92-0 | 1,1-Dibromoethylene |
| 594-02-5 | 1,1-Diiodoethane |
| 594-16-1 | Propane, 2,2-dibromo- |
| 594-37-6 | 1,2-dichloro-2-methylpropane |
| 594-73-0 | Hexabromoethane |
| 598-16-3 | Ethylene tribromide |
| 598-29-8 | 1,2-Diiodopropane |

| CAS | Chemical List |
|-----------|--|
| 624-72-6 | <i>1,2-Difluoroethane (HFC-152)</i> |
| 624-73-7 | <i>Ethane, 1,2-diiodo-</i> |
| 627-31-6 | Propane, 1,3-diiodo- |
| 630-16-0 | Ethane, 1,1,1,2-tetrabromo- |
| 661-95-0 | Propane, 1,2-dibromo-1,1,2,3,3,3-hexafluoro- |
| 661-97-2 | 1,2-Dichloro-1,1,2,3,3,3-hexafluoropropane |
| 662-00-0 | 1,1,1,2,2,3,3-Heptafluorobutane |
| 662-01-1 | 1,3-Dichloro-1,1,2,2,3,3-hexafluoropropane |
| 677-54-3 | 1,1,1,3-Tetrachloro-2,2-difluoropropane |
| 677-55-4 | 1-Chloro-1,1,3,3,3-pentafluoropropane |
| 677-56-5 | 1,1,1,2,2,3-Hexafluoropropane |
| 679-85-6 | 3-Chloro-1,1,2,2-tetrafluoropropane |
| 679-86-7 | 1,1,2,2,3-Pentafluoropropane |
| 679-99-2 | 1-Chloro-1,1,2,2,3-pentafluoropropane |
| 685-63-2 | <i>1,3-Butadiene, 1,1,2,3,4,4-hexafluoro-</i> |
| 697-11-0 | Cyclobutene, hexafluoro- |
| 811-95-0 | 1,1,2-Trichloro-1-fluoroethane |
| 821-06-7 | 2-Butene, 1,4-dibromo-, (2E)- |
| 1112-01-2 | 1,1-Dichloro-2,2-difluoropropane |
| 1112-14-7 | 1,1,3,3-Tetrachloro-2,2-difluoropropane |
| 1112-36-3 | 1,3-Dichloro-2,2-difluoropropane |
| 1511-62-2 | Bromodifluoromethane |
| 1516-64-9 | 2-Butene, 1,1,1,2,3,4,4,4-octafluoro-, (E)- |
| 1542-18-3 | Propane, 2-(difluoroiodomethyl)-1,1,1,2,3,3,3-heptafluoro- |
| 1615-75-4 | 1-Chloro-1-fluoroethane |

| CAS | Chemical List |
|------------|---|
| 1645-83-6 | 1,3,3,3-Tetrafluoropropene |
| 1691-13-0 | 1,2-Fluoroethene |
| 1814-88-6 | Pentafluoropropane |
| 1842-05-3 | 1,1-Dichloro-1,2-difluoroethane |
| 1868-53-7 | Methane, dibromofluoro- |
| 2252-84-8 | 1,1,2,2,3,3,3-Heptafluoropropane |
| 2268-46-4 | 1,2,2,3-Tetrachloro-1,1,3,3-tetrafluoropropane |
| 2311-14-0 | 1,1,1-Tribromoethane |
| 2354-06-5 | 1,1,1,3,3-Pentachloro-2,2,3-trifluoropropane |
| 2366-36-1 | 1,1,1-Trichloro-2-fluoroethane |
| 2730-43-0 | 1-Chloro-3,3,3-trifluoropropene |
| 2730-64-5 | 1-Chloro-1,1,3,3-tetrafluoropropane |
| 3017-69-4 | 1-Propene, 1-bromo-2-methyl- (9CI) |
| 3470-67-5 | Ethane, 1,1,1,2-tetrabromo-2,2-difluoro- |
| 4071-01-6 | 1,1-Dichloro-2,2,3,3-tetrafluoropropane |
| 4259-43-2 | 1,1,1-Trichloro-2,2,3,3,3-pentafluoropropane |
| 4399-47-7 | Bromocyclobutane |
| 4459-18-1 | Propane, 1,1,1,3,3,3-hexafluoro-2-iodo-2-(trifluoromethyl)- |
| 4784-77-4 | 2-Butene, 1-bromo- |
| 5162-44-7 | 1-Butene, 4-bromo- |
| 6974-12-5 | 2-Butene, 1,4-dibromo- |
| 7051-34-5 | Bromomethylcyclopropane |
| 7125-99-7 | 1,1-Dichloro-1,2,2-trifluoropropane |
| 11070-66-9 | Butene, octafluoro- |
| 13195-80-7 | 1-Propene, 1,1-dibromo- |

| CAS | Chemical List |
|------------|---|
| 17705-30-5 | 2,2-Dichloro-1,1,3,3-tetrafluoropropane |
| 18599-22-9 | 1-Butene, 4-bromo-3,3,4-tetrafluoro- |
| 19041-02-2 | 2-Chloro-1,1,3,3-tetrafluoropropane |
| 19398-48-2 | 2-Butene, 2,3-dibromo- |
| 20972-44-5 | 2-Butene, 1,4-dichloro-1,1,2,3,4,4-hexafluoro-, (2E)- |
| 24270-66-4 | 1,1,2,3,3-Pentafluoropropane |
| 25167-20-8 | Tetrabromoethane |
| 25429-23-6 | Ethene, dibromo- |
| 25497-29-4 | Chlorodifluoroethane |
| 25497-29-4 | 1-Chloro-1,2-difluoroethane |
| 25915-78-0 | Dichlorodifluoroethane |
| 26391-16-2 | 1-Propene, 1,2-dibromo- |
| 27072-47-5 | Dibromopropane |
| 27336-23-8 | 1,1-Dibromo-1,2,2,2-tetrafluoroethane |
| 28103-66-4 | 1-Chloro-1,2,2,3,3-pentafluoropropane |
| 28984-80-7 | Butane, trichloroheptafluoro- |
| 30283-90-0 | Ethane, bromotetrafluoro- |
| 31392-96-8 | Ethane, dibromodifluoro- |
| 40723-63-5 | 1,1,2,2-Tetrafluoropropane |
| 40723-80-6 | Butane, 1,1,1,2,2-pentafluoro-4-iodo- |
| 51346-64-6 | 2-Chloro-1,1,1,2,3,3-hexafluoropropane |
| 56758-54-4 | 1-Chloro-2,2,3-trifluoropropane |
| 64712-27-2 | 1,1-Dichloro-1,3,3,3-tetrafluoropropane |
| 67406-66-0 | 1-Chloro-1,2,2,3-tetrafluoropropane |
| 67406-68-2 | 1,3-Dichloro-1,2,2-trifluoropropane |

| CAS | Chemical List |
|-------------|---|
| 70192-63-1 | 1,1-Dichloro-1,2,2,3-tetrafluoropropane |
| 70192-70-0 | 1,1-Dichloro-2,2,3-trifluoropropane |
| 70192-76-6 | 1-Chloro-1,2,2-trifluoropropane |
| 70341-81-0 | 1,3-Dichloro-1,2,2,3-tetrafluoropropane |
| 72101-30-5 | Propane, bromotrifluoro- |
| 75995-72-1 | 1,1,1,2,3,4,4,4-Octafluorobutane |
| 76140-39-1 | 1,3-Dichloro-1,1,3,3-tetrafluoropropane |
| 76546-99-3 | Hexachlorodifluoropropane |
| 110587-14-9 | Chlorofluoroethane |
| 117970-90-8 | 2-Chloro-1,1,1,3-tetrafluoropropane |
| 127564-83-4 | Dichlorotetrafluoropropane |
| 131211-71-7 | 1,1,1-Trichloro-2,2,3-trifluoropropane |
| 131221-36-8 | 1,1,3-Trichloro-2,2,3-trifluoropropane |
| 134190-48-0 | Pentachlorofluoropropane |
| 134190-49-1 | Tetrachlorofluoropropane |
| 134190-50-4 | Chlorotetrafluoropropane |
| 134190-51-5 | Trichlorofluoropropane |
| 134190-52-6 | Dichlorodifluoropropane |
| 134190-53-7 | Chlorodifluoropropane |
| 134190-54-8 | Chlorofluoropropane |
| 134237-36-8 | Pentachlorodifluoro propane |
| 134237-37-9 | Tetrachlorotrifluoro propane |
| 134237-38-0 | Trichlorotetrafluoro propane |
| 134237-39-1 | Tetrachlorodifluoropropane |
| 134237-40-4 | Trichlorotrifluoropropane |

| CAS | Chemical List |
|-------------|---|
| 134237-41-5 | Chloropentafluoropropane |
| 134237-42-6 | Trichlorodifluoropropane |
| 134237-43-7 | Dichlorotrifluoropropane |
| 134237-44-8 | Chlorotrifluoropropane |
| 134237-45-9 | Dichlorofluoropropane |
| 134251-06-2 | 2-Chloro-1,1,1,3,3-pentafluoropropane |
| 134308-72-8 | Chlorohexafluoropropane |
| 146916-90-7 | 2,3-Dichloro-1,1,1,3-tetrafluoropropane |
| 149329-24-8 | 2,2-Dichloro-1,1,1,3-tetrafluoropropane |
| 149329-25-9 | 2,3-Dichloro-1,1,1,2-tetrafluoropropane |
| 149329-26-0 | 1,2-Dichloro-1,1,2,3-tetrafluoropropane |
| 149329-27-1 | 1,3-Dichloro-1,1,2-trifluoropropane |
| 151771-08-3 | 1,3-Dichloro-1,2,3-trifluoropropane |

1240 Hexabromocyclododecane (HBCD)

Includes only the chemicals listed here

| CAS | Chemical Name |
|------------|------------------------|
| 25637-99-4 | hexabromocyclododecane |
| 301-04-2 | Lead Acetate |

1026 Lead Compounds

Includes any unique chemical substance that contains lead as part of the chemical's infrastructure.
Includes, but is not limited to:

| CAS | Chemical Name |
|-----------|------------------|
| 592-87-0 | Lead Thiocyanate |
| 1072-35-1 | Lead Stearate |
| 1314-87-0 | Lead Sulfide |

| CAS | Chemical Name |
|------------|------------------------|
| 1335-32-6 | Lead Subacetate |
| 7428-48-0 | Lead Stearate |
| 7446-27-7 | Lead Phosphate |
| 7446-14-2 | Lead Sulfate |
| 7645-25-2 | Lead Arsenate |
| 7758-95-4 | Lead Chloride |
| 7783-46-2 | Lead Fluoride |
| 10099-74-8 | Lead Nitrate |
| 10101-63-0 | Lead Iodide |
| 10102-48-4 | Lead Arsenate |
| 13814-96-5 | Lead Fluoborate |
| 15739-80-7 | Lead Sulfate |
| 52652-59-2 | Lead Stearate |
| 56189-09-4 | Lead Stearate |
| 7722-64-7 | Potassium Permanganate |

1027 Manganese Compounds

Includes any unique chemical substance that contains lead as part of the chemical's infrastructure.
Includes, but is not limited to:

| CAS | Chemical Name |
|------------|---|
| 15339-36-3 | Manganese, bis(dimethylcarbamidithiato-s-s) |
| 592-04-1 | Mercuric Cyanide |

1028 Mercury Compounds

Includes any unique chemical substance that contains mercury as part of the chemical's infrastructure.
Includes, but is not limited to:

| CAS | Chemical Name |
|------------|----------------------|
| 592-85-8 | Mercuric Thiocyanate |
| 628-86-4 | Mercury Fulminate |
| 7782-86-7 | Mercurous Nitrate |
| 7783-35-9 | Mercuric sulfate |
| 10415-75-5 | Mercurous Nitrate |
| 10045-94-0 | Mercuric Nitrate |
| 557-19-7 | Nickel Cyanide |

1029 Nickel Compounds

Includes any unique chemical substance that contains nickel as part of the chemical's infrastructure.
Includes, but is not limited to:

| CAS | Chemical Name |
|------------|-------------------------|
| 7718-54-9 | Nickel chloride |
| 7786-81-4 | Nickel Sulfate |
| 12054-48-7 | Nickel Hydroxide |
| 13463-39-3 | Nickel Carbonyl |
| 14216-75-2 | Nickel Nitrate |
| 15699-18-0 | Nickel Ammonium Sulfate |
| 37211-05-5 | Nickel chloride |
| 54-11-5 | Nicotine |

1055 Nicotine and Salts

Includes any unique chemical substance that contains nicotine or a nicotine salt as part of the chemical's infrastructure. Includes, but is not limited to:

| CAS | Chemical Name |
|-----------|------------------|
| 1004-54-0 | Mercuric Nitrate |

1090 Nitrate Compounds (water dissociable)

Includes, but is not limited to:

| CAS | Chemical Name |
|------------|-------------------|
| 7761-88-8 | Silver Nitrate |
| 7779-88-6 | Zinc Nitrate |
| 7782-86-7 | Mercurous Nitrate |
| 7787-55-5 | Beryllium Nitrate |
| 10099-74-8 | Lead Nitrate |
| 10102-06-4 | Uranyl nitrate |
| 10102-45-1 | Thallium Nitrate |
| 10415-75-5 | Mercurous Nitrate |
| 10421-48-4 | Ferric Nitrate |
| 13597-99-4 | Beryllium Nitrate |
| 13746-89-9 | Zirconium Nitrate |
| 14216-75-2 | Nickel Nitrate |
| 36478-76-9 | Uranyl Nitrate |

1034 Polybrominated Biphenyls (PBBs)

Please see EPA's Technical Fact Sheet – Polybrominated Biphenyls (PBBs) for further guidance.

1220 Nonylphenols

Includes only the chemicals listed here

| CAS | Chemical Name |
|------------|----------------|
| 104-40-5 | 4-Nonylphenol |
| 11066-49-2 | Isononylphenol |
| 25154-52-3 | Nonylphenol |

| CAS | Chemical Name |
|------------|-------------------------|
| 26543-97-5 | 4-Isononylphenol |
| 84852-15-3 | 4-Nonylphenol, branched |
| 90481-04-2 | Nonylphenol, branched |

1046 Nonylphenol Ethoxylates (NPEs)

Includes only the chemicals listed here

| CAS | Chemical Name |
|-------------|---|
| 7311-27-5 | Ethanol, 2-[2-[2-[2-(4-nonylphenoxy)ethoxy]ethoxy]ethoxy]- |
| 9016-45-9 | Poly(oxy-1,2-ethanediyl), α -(nonylphenyl)- ω -hydroxy- |
| 20427-84-3 | Ethanol, 2-[2-(4-nonylphenoxy)ethoxy]- |
| 26027-38-3 | Poly(oxy-1,2-ethanediyl), α -(4-nonylphenyl)- ω -hydroxy- |
| 26571-11-9 | 3,6,9,12,15,18,21,24-Octaoxahexacosan-1-ol, 26-(nonylphenoxy)- |
| 27176-93-8 | Ethanol, 2-[2-(nonylphenoxy)ethoxy]- |
| 27177-05-5 | 3,6,9,12,15,18,21-Heptaoxatricosan-1-ol, 23-(nonylphenoxy)- |
| 27177-08-8 | 3,6,9,12,15,18,21,24,27-Nonaoxanonacosan-1-ol, 29-(nonylphenoxy)- |
| 27986-36-3 | Ethanol, 2-(nonylphenoxy)- |
| 37205-87-1 | Poly(oxy-1,2-ethanediyl), α -(isononylphenyl)- ω hydroxy- |
| 51938-25-1 | Poly(oxy-1,2-ethanediyl), α (2-nonylphenyl)- ω -hydroxy- |
| 68412-54-4 | Poly(oxy-1,2-ethanediyl), α -(nonylphenyl)- ω -hydroxy-, branched |
| 127087-87-0 | Poly(oxy-1,2-ethanediyl), α -(4-nonylphenyl)- ω -hydroxy-, branched |

1300 Certain PFAS NOL

Is defined as those PFAS that contain:

- a perfluoroalkyl moiety⁸ with three or more carbons (e.g., $-\text{C}_n\text{F}_{2n-}$, $n \geq 3$; or $\text{CF}_3-\text{C}_n\text{F}_{2n-}$, $n \geq 2$)

⁸ "In organic chemistry, a **moiety** is a part of a molecule that is given a name because it is identified as a part of other molecules as well." Source: Moiety (chemistry) - Wikipedia

- a perfluoroalkylether moiety with two or more carbons (e.g., $-C_nF_{2n}OC_mF_{2m}-$ or $-C_nF_{2n}OC_mF_m-$, n and m \geq 1)

| CAS | Chemical Name |
|----------|---|
| 79-19-7 | Propane, 1,1,1,2,2,3,3,3-octafluoro |
| 115-25-3 | Cyclobutane, 1,1,2,2,3,3,4,4-octafluoro |
| 306-91-2 | Phenanthrene, 1,1,2,2,3,3,4,4,4a,4b,5,5,6,6,7,7,8,8,8a,9,9,10,10,10a-tetracosafuorotetradecahydro- |
| 306-94-5 | Naphthalene, 1,1,2,2,3,3,4,4,4a,5,5,6,6,7,7,8,8,8a-octadecafluorodecahydro- |
| 307-30-2 | 1-Octanol, 2,2,3,3,4,4,5,5,6,6,7,7,8,8,8-pentadecafluoro- |
| 307-34-6 | Octane, 1,1,1,2,2,3,3,4,4,5,5,6,6,7,7,8,8,8-octadecafluoro- |
| 307-60-8 | Dodecane, 1,1,1,2,2,3,3,4,4,5,5,6,6,7,7,8,8,9,9,10,10,11,11,12,12-pentacosafuoro-12-iodo- |
| 307-63-1 | Tetradecane, 1,1,1,2,2,3,3,4,4,5,5,6,6,7,7,8,8,9,9,10,10,11,11,12,12,13,13,14,14-nonacosafuoro-14-iodo- |
| 307-70-0 | 1-Undecanol, 2,2,3,3,4,4,5,5,6,6,7,7,8,8,9,9,10,10,11,11-eicosafuoro- |
| 307-98-2 | 2-Propenoic acid, 2,2,3,3,4,4,5,5,6,6,7,7,8,8,8-pentadecafluorooctyl ester |
| 311-89-7 | 1-Butanamine, 1,1,2,2,3,3,4,4,4-nonafluoro-N,N-bis(1,1,2,2,3,3,4,4,4-nonafluorobutyl)- |
| 355-02-2 | Cyclohexane, 1,1,2,2,3,3,4,4,5,5,6-undecafluoro-6-(trifluoromethyl)- |
| 355-25-9 | n-perfluorobutane |
| 355-38-4 | Hexanoyl fluoride, 2,2,3,3,4,4,5,5,6,6,6-undecafluoro- |
| 355-42-0 | Hexane, 1,1,1,2,2,3,3,4,4,5,5,6,6,6-tetradecafluoro- |
| 355-43-1 | Hexane, 1,1,1,2,2,3,3,4,4,5,5,6,6-tridecafluoro-6-iodo- |
| 355-50-0 | Hexadecane, 1,1,1,2,2,3,3,4,4,5,5,6,6,7,7,8,8,9,9,10,10,11,11,12,12,13,13,14,14,15,15,16,16-tritriacontafuoro-16-iodo- |
| 355-80-6 | 1-Pentanol, 2,2,3,3,4,4,5,5-octafluoro- |

| CAS | Chemical Name |
|----------|---|
| 356-24-1 | Butanoic acid, 2,2,3,3,4,4,4-heptafluoro-, methyl ester |
| 356-27-4 | Butanoic acid, 2,2,3,3,4,4,4-heptafluoro-, ethyl ester |
| 375-00-8 | Butanenitrile, 2,2,3,3,4,4,4-heptafluoro- |
| 375-01-9 | 1-Butanol, 2,2,3,3,4,4,4-heptafluoro- |
| 375-03-1 | Propane, 1,1,1,2,2,3,3-heptafluoro-3-methoxy- |
| 375-16-6 | Butanoyl chloride, 2,2,3,3,4,4,4-heptafluoro- |
| 375-22-4 | Butanoic acid, 2,2,3,3,4,4,4-heptafluoro- |
| 375-62-2 | Pentanoyl fluoride, 2,2,3,3,4,4,5,5,5-nonafluoro- |
| 375-72-4 | 1-Butanesulfonyl fluoride, 1,1,2,2,3,3,4,4,4-nonafluoro- |
| 375-73-5 | 1-Butanesulfonic acid, 1,1,2,2,3,3,4,4,4-nonafluoro- |
| 375-84-8 | Heptanoyl fluoride, 2,2,3,3,4,4,5,5,6,6,7,7,7-tridecafluoro- |
| 375-85-9 | Heptanoic acid, 2,2,3,3,4,4,5,5,6,6,7,7,7-tridecafluoro- |
| 375-88-2 | Heptane, 1-bromo-1,1,2,2,3,3,4,4,5,5,6,6,7,7,7-pentadecafluoro- |
| 376-73-8 | Pentanedioic acid, 2,2,3,3,4,4-hexafluoro- |
| 376-90-9 | 1,5-Pentanediol, 2,2,3,3,4,4-hexafluoro- |
| 377-73-1 | Perfluoro-3-methoxypropanoic acid |
| 382-28-5 | Morpholine, 2,2,3,3,5,5,6,6-octafluoro-4-(trifluoromethyl)- |
| 423-39-2 | Butane, 1,1,1,2,2,3,3,4,4-nonafluoro-4-iodo |
| 423-62-1 | Decane, 1,1,1,2,2,3,3,4,4,5,5,6,6,7,7,8,8,9,9,10,10-heneicosafuoro-10-iodo- |
| 425-38-7 | Propanoyl fluoride, 2,2,3,3-tetrafluoro-3-(trifluoromethoxy)- |
| 428-59-1 | Trifluoro(trifluoromethyl)oxirane |
| 507-63-1 | Octane, 1,1,1,2,2,3,3,4,4,5,5,6,6,7,7,8,8-heptadecafluoro-8-iodo- |
| 559-40-0 | Cyclopentene, 1,2,3,3,4,4,5,5-octafluoro- |
| 647-42-7 | 1-Octanol, 3,3,4,4,5,5,6,6,7,7,8,8,8-tridecafluoro- |

| CAS | Chemical Name |
|-----------|---|
| 678-26-2 | Pentane, 1,1,1,2,2,3,3,4,4,5,5,5-dodecafluoro- |
| 754-35-7 | Propane, 1,1,1,2,2,3,3-heptafluoro-3-iodo- |
| 756-12-7 | 2-Butanone, 1,1,1,3,4,4,4-heptafluoro-3-(trifluoromethyl)- |
| 756-13-8 | 3-Pentanone, 1,1,1,2,2,4,5,5,5-nonafluoro-4-(trifluoromethyl)- |
| 773-14-8 | Furan, 2,2,3,3,4,4,5,5-octafluorotetrahydro- |
| 813-44-5 | Bis(perfluoroisopropyl)ketone |
| 813-45-6 | 3-Hexanone, 1,1,1,2,4,4,5,5,6,6,6-undecafluoro-2-(trifluoromethyl)- |
| 1547-26-8 | 1-Pentene, 2,3,3,4,4,5,5-heptafluoro- |
| 1623-05-8 | Propane, 1,1,1,2,2,3,3-heptafluoro-3-[(1,2,2-trifluoroethenyl)oxy]- |
| 1682-78-6 | Propanoyl fluoride, 2,3,3,3-tetrafluoro-2-(1,1,2,2,2-pentafluoroethoxy)- |
| 1805-22-7 | Perfluoromethylcyclopentane |
| 1892-03-1 | Cyclopentene, 1,3,3,4,4,5,5-heptafluoro- |
| 2043-47-2 | 1-Hexanol, 3,3,4,4,5,5,6,6,6-nonafluoro- |
| 2043-55-2 | Hexane, 1,1,1,2,2,3,3,4,4-nonafluoro-6-iodo- |
| 2043-57-4 | Octane, 1,1,1,2,2,3,3,4,4,5,5,6,6-tridecafluoro-8-iodo- |
| 2062-98-8 | Propanoyl fluoride, 2,3,3,3-tetrafluoro-2-(1,1,2,2,3,3,3-heptafluoropropoxy)- |
| 2144-53-8 | 2-Propenoic acid, 2-methyl-, 3,3,4,4,5,5,6,6,7,7,8,8,8-tridecafluorooctyl ester |
| 2218-54-4 | Butanoic acid, 2,2,3,3,4,4,4-heptafluoro-, sodium salt (1:1) |
| 2641-34-1 | Propanoyl fluoride, 2,3,3,3-tetrafluoro-2-[1,1,2,3,3,3-hexafluoro-2-(1,1,2,2,3,3,3-heptafluoropropoxy)propoxy]- |
| 2706-90-3 | Pentanoic acid, 2,2,3,3,4,4,5,5,5-nonafluoro- |
| 2927-83-5 | 2,3,3,3-Tetrafluoro-2-(trifluoromethoxy)propionyl fluoride |
| 2966-54-3 | Potassium perfluorobutanoate |
| 2994-71-0 | Cyclobutane, 1,1,2,2,3,4-hexafluoro-3,4-bis(trifluoromethyl)- |

| CAS | Chemical Name |
|------------|---|
| 3108-42-7 | Ammonium perfluorodecanoate |
| 3330-14-1 | Propane, 1-[1-[difluoro(1,2,2,2-tetrafluoroethoxy)methyl]-1,2,2,2-tetrafluoroethoxy]-1,1,2,2,3,3,3-heptafluoro- |
| 3330-15-2 | Perfluoro-3-(1H-perfluoroethoxy)propane |
| 3330-16-3 | 2H-Perfluoro(5,8-dimethyl-3,6,9-trioxadodecane) |
| 3794-64-7 | Butanoic acid, 2,2,3,3,4,4,4-heptafluoro-, silver(1+) salt (1:1) |
| 3830-45-3 | Sodium perfluorodecanoate |
| 3934-23-4 | 2-Propenoic acid, 2-methyl-, 2,2,3,3,4,4,5,5,6,6,7,7,8,8,8-pentadecafluorooctyl ester |
| 4089-58-1 | Propanoyl fluoride, 2,3,3,3-tetrafluoro-2-[1,1,2,3,3,3-hexafluoro-2-[1,1,2,2-tetrafluoro-2-(fluorosulfonyl)ethoxy]propoxy]- |
| 6130-43-4 | Heptanoic acid, 2,2,3,3,4,4,5,5,6,6,7,7,7-tridecafluoro-, ammonium salt (1:1) |
| 6588-63-2 | Cyclohexanecarbonyl fluoride, 1,2,2,3,3,4,4,4,5,5,6,6-undecafluoro- |
| 9002-84-0 | Polytetrafluoroethylene |
| 9011-17-0 | Poly(vinylidene fluoride-co-hexafluoropropylene) |
| 10493-43-3 | Ethene, 1,1,2-trifluoro-2-(1,1,2,2,2-pentafluoroethoxy)- |
| 10495-86-0 | Ammonium perfluorobutanoate |
| 13221-71-1 | Hexafluoro-1,3-bis(trifluoromethyl)cyclobutane |
| 13429-24-8 | 1-Propene, 1,1,2,3,3,3-hexafluoro-, dimer |
| 13695-31-3 | 2-Propenoic acid, 2-methyl-, 2,2,3,3,4,4,4-heptafluorobutyl ester |
| 15290-77-4 | Cyclopentane, 1,1,2,2,3,3,4-heptafluoro- |
| 16090-14-5 | Ethanesulfonyl fluoride, 2-[1-[difluoro[(1,2,2-trifluoroethenyl)oxy]methyl]-1,2,2,2-tetrafluoroethoxy]-1,1,2,2-tetrafluoro- |
| 17527-29-6 | 2-Propenoic acid, 3,3,4,4,5,5,6,6,7,7,8,8,8-tridecafluorooctyl ester |
| 17631-68-4 | Europium, tris(6,6,7,7,8,8,8-heptafluoro-2,2-dimethyl-3,5-octanedionato- β O3, β O5)- |

| CAS | Chemical Name |
|------------|---|
| 17978-77-7 | Praseodymium, tris(6,6,7,7,8,8,8-heptafluoro-2,2-dimethyl-3,5-octanedionato- β O3, β O5)- |
| 19430-93-4 | 1-Hexene, 3,3,4,4,5,5,6,6,6-nonafluoro- |
| 20006-68-2 | Dichloro-3-(perfluoro-2-propoxy)propylmethylsilane |
| 24520-19-2 | Pentafluoro(1,2,2-trifluoro-2-((trifluorovinyl)oxy)-1-(trifluoromethyl)ethoxy)benzene |
| 25038-02-2 | Fomblin Y 04 |
| 25038-71-5 | poly(1,1,2,2-tetrafluorobutane-1,4-diyl) |
| 25067-11-2 | 1-Propene, 1,1,2,3,3,3-hexafluoro-, polymer with 1,1,2,2-tetrafluoroethene |
| 25190-89-0 | 1-Propene, 1,1,2,3,3,3-hexafluoro-, polymer with 1,1-difluoroethene and 1,1,2,2-tetrafluoroethene |
| 25291-17-2 | 1-Octene, 3,3,4,4,5,5,6,6,7,7,8,8,8-tridecafluoro- |
| 25684-76-8 | Ethene, 1,1,2,2-tetrafluoro-, polymer with 1,1-difluoroethene |
| 26425-79-6 | Ethene, 1,1,2,2-tetrafluoro-, polymer with 1,2,2-trifluoro-2-(trifluoromethoxy)ethene |
| 26650-09-9 | Thiocyanic acid, 3,3,4,4,5,5,6,6,7,7,8,8,8-tridecafluorooctyl ester |
| 26654-97-7 | Ethanesulfonyl fluoride, 2-[1-[difluoro[(1,2,2-trifluoroethenyl)oxy]methyl]-1,2,2,2-tetrafluoroethoxy]-1,1,2,2-tetrafluoro-, polymer with 1,1,2,2-tetrafluoroethene |
| 26655-00-5 | Propane, 1,1,1,2,2,3,3-heptafluoro-3-[(1,2,2-trifluoroethenyl)oxy]-, polymer with 1,1,2,2-tetrafluoroethene |
| 26655-00-5 | Perfluoroalkoxy alkanes (PFA) |
| 26658-70-8 | Benzene, pentafluoro[1,2,2-trifluoro-2-[(trifluoroethenyl)oxy]-1-(trifluoromethyl)ethoxy]-, polymer with tetrafluoroethene and trifluoro(trifluoromethoxy)ethene |
| 26738-51-2 | 3,6,9,12-Tetraoxapentadecane, 1,1,1,2,4,4,5,7,7,8,10,10,11,13,13,14,14,15,15,15-icosafuoro-5,8,11-tris(trifluoromethyl)- |
| 26779-98-6 | Propanoic acid, ethenyl ester, polymer with 1,1-difluoroethene and 1,1,2,2-tetrafluoroethene |

| CAS | Chemical Name |
|------------|---|
| 27029-05-6 | 1-Propene, polymer with 1,1,2,2-tetrafluoroethene |
| 27619-88-1 | 1-Hexanesulfonyl chloride, 3,3,4,4,5,5,6,6,6-nonafluoro- |
| 27619-89-2 | 1-Octanesulfonyl chloride, 3,3,4,4,5,5,6,6,7,7,8,8,8-tridecafluoro- |
| 27619-94-9 | 6:2 Fluorotelomer sulfonate sodium salt |
| 27619-97-2 | 1-Octanesulfonic acid, 3,3,4,4,5,5,6,6,7,7,8,8,8-tridecafluoro- (6:2 Fluorotelomer sulfonate acid) |
| 29809-34-5 | Eicosane, 1,1,1,2,2,3,3,4,4,5,5,6,6,7,7,8,8,9,9,10,10,11,11,12,12,13,13,14,14,15,15,16,16,17,17,18,18,19,19,20,20-hentetracontafluoro-20-iodo- |
| 29809-35-6 | Octadecane, 1,1,1,2,2,3,3,4,4,5,5,6,6,7,7,8,8,9,9,10,10,11,11,12,12,13,13,14,14,15,15,16,16,17,17,18,18-heptatriacontafluoro-18-iodo- |
| 31175-20-9 | Ethanesulfonic acid, 2-[1-[difluoro[(1,2,2-trifluoroethenyl)oxy]methyl]-1,2,2,2-tetrafluoroethoxy]-1,1,2,2-tetrafluoro-, polymer with 1,1,2,2-tetrafluoroethene |
| 34454-97-2 | 1-Butanesulfonamide, 1,1,2,2,3,3,4,4,4-nonafluoro-N-(2-hydroxyethyl)-N-methyl- |
| 34455-29-3 | 1-Propanaminium, N-(carboxymethyl)-N,N-dimethyl-3-[[[(3,3,4,4,5,5,6,6,7,7,8,8,8-tridecafluorooctyl)sulfonyl]amino]-, inner salt |
| 34788-82-4 | Europium, tris[3-[2,2,3,3,4,4,4-heptafluoro-1-(oxo-βO)butyl]-1,7,7-trimethylbicyclo[2.2.1]heptan-2-onato-βO]- |
| 35397-13-8 | Propane, 1,1,1,2,2,3,3-heptafluoro-3-[(1,2,2-trifluoroethenyl)oxy]-, polymer with 1-chloro-1,2,2-trifluoroethene and ethene |
| 35560-16-8 | 1-Propene, 1,1,2,3,3,3-hexafluoro-, polymer with ethene and 1,1,2,2-tetrafluoroethene |
| 37486-69-4 | 3,6,9,12,15-Pentaoxaoctadecane, 1,1,1,2,4,4,5,7,7,8,10,10,11,13,13,14,16,16,17,17,18,18,18-tricosafuoro-5,8,11,14-tetrakis(trifluoromethyl)- |
| 37626-13-4 | Poly[4,5-difluoro-2,2-bis(trifluoromethyl)-1,3-dioxole-co-tetrafluoroethylene] |
| 38565-52-5 | Oxirane, 2-(2,2,3,3,4,4,5,5,6,6,7,7,7-tridecafluoroheptyl)- |
| 42532-60-5 | 2,3,3,3-Tetrafluoro-2-(trifluoromethyl)propanenitrile |

| CAS | Chemical Name |
|------------|---|
| 45048-62-2 | Perfluorobutanoate |
| 45187-15-3 | Perfluorobutanesulfonate |
| 51798-33-5 | Poly[oxy(trifluoro(trifluoromethyl)-1,2-ethanediyl)], α -(1-carboxy-1,2,2,2-tetrafluoroethyl)- ω -[tetrafluoro(trifluoromethyl)ethoxy]- |
| 51851-37-7 | Silane, triethoxy(3,3,4,4,5,5,6,6,7,7,8,8,8-tridecafluorooctyl)- |
| 52591-27-2 | 2-Propenoic acid, 3,3,4,4,5,5,6,6,6-nonafluorohexyl ester |
| 53518-00-6 | 1-Propanaminium, N,N,N-trimethyl-3-[[1,1,2,2,3,3,4,4,4-nonafluorobutyl)sulfonyl]amino]-, chloride (1:1) |
| 54302-04-4 | Chlorotrifluoro ethylene, ethylene, hexafluoroisobutylene terpolymer |
| 54950-05-9 | Butanedioic acid, 2-sulfo-, 1,4-bis(3,3,4,4,5,5,6,6,7,7,8,8,8-tridecafluorooctyl) ester, sodium salt (1:1) |
| 55716-11-5 | Morpholine, 2,2,3,3,5,5,6,6-octafluoro-4-(1,1,2,2,2-pentafluoroethyl)- |
| 56357-87-0 | Ethene, 1,1,2,2-tetrafluoro-, polymer with 1,1-difluoroethene and 1,1,2-trifluoro-2-(trifluoromethoxy)ethene |
| 56467-05-1 | Poly(oxy-1,2-ethanediyl), α -(tridecafluorohexyl)- ω -hydroxy- |
| 57570-64-6 | 1-Propene, 1,1,2,3,3,3-hexafluoro-, polymer with 1,1-difluoroethene, 1,1,2,2-tetrafluoroethene and 1,1,2-trifluoro-2-(trifluoromethoxy)ethene |
| 58194-00-6 | Propanoyl fluoride, 2,3,3,3-tetrafluoro-2-[1,1,2,2,3,3-hexafluoro-3-(trifluoromethoxy)propoxy]- |
| 59587-38-1 | 6:2 Fluorotelomer sulfonate potassium salt |
| 59587-39-2 | 6:2 Fluorotelomer sulfonate ammonium salt |
| 60164-51-4 | Poly[oxy(trifluoro(trifluoromethyl)-1,2-ethanediyl)], α -(1,1,2,2,2-pentafluoroethyl)- ω -[tetrafluoro(trifluoromethyl)ethoxy]- |
| 63654-41-1 | 1-Propene, 1,1,2,3,3,3-hexafluoro-, polymer with 1,1,1,2,2,3,3-heptafluoro-3-[(1,2,2-trifluoroethenyl)oxy]propane and 1,1,2,2-tetrafluoroethene |
| 63863-43-4 | Propanoic acid, 3-[1-[difluoro[(1,2,2-trifluoroethenyl)oxy]methyl]-1,2,2,2-tetrafluoroethoxy]-2,2,3,3-tetrafluoro-, methyl ester |

| CAS | Chemical Name |
|------------|--|
| 63863-44-5 | Propanoic acid, 3-[1-[difluoro[(1,2,2-trifluoroethenyl)oxy]methyl]-1,2,2,2-tetrafluoroethoxy]-2,2,3,3-tetrafluoro-, methyl ester, polymer with 1,1,2,2-tetrafluoroethene |
| 65059-79-2 | 1-Butene, 4-bromo-3,3,4,4-tetrafluoro-, polymer with 1,1-difluoroethene, 1,1,2,2-tetrafluoroethene and 1,1,2-trifluoro-2-(trifluoromethoxy)ethene |
| 65208-35-7 | Poly[oxy(trifluoro(trifluoromethyl)-1,2-ethanediyl)], .alpha.-[1,2,2,2-tetrafluoro-1-(fluorocarbonyl)ethyl]-.omega.-[tetrafluoro(trifluoromethyl)ethoxy]- |
| 65530-82-7 | Poly(difluoromethylene), alpha,omega-difluoro- |
| 65530-85-0 | Poly(difluoromethylene), .alpha.-(cyclohexylmethyl)-.omega.-hydro- |
| 67584-51-4 | Glycine, N-ethyl-N-[(1,1,2,2,3,3,4,4,4-nonafluorobutyl)sulfonyl]-, potassium salt (1:1) |
| 67584-55-8 | 2-Propenoic acid, 2-[methyl[(1,1,2,2,3,3,4,4,4-nonafluorobutyl)sulfonyl]amino]ethyl ester |
| 67584-59-2 | 2-Propenoic acid, 2-methyl-, 2-[methyl[(1,1,2,2,3,3,4,4,4-nonafluorobutyl)sulfonyl]amino]ethyl ester |
| 67939-95-1 | 1-Propanaminium, N,N,N-trimethyl-3-[[[(1,1,2,2,3,3,4,4,4-nonafluorobutyl)sulfonyl]amino]-, iodide (1:1) |
| 68182-34-3 | 1-Propene, 1,1,2,3,3,3-hexafluoro-, polymer with 1,1-difluoroethene, 1,1,1,2,2,3,3-heptafluoro-3-[(1,2,2-trifluoroethenyl)oxy]propane and 1,1,2,2-tetrafluoroethene |
| 68258-85-5 | 1-Hexene, 3,3,4,4,5,5,6,6,6-nonafluoro-, polymer with ethene and 1,1,2,2-tetrafluoroethene |
| 68259-10-9 | 1-Butanesulfonic acid, 1,1,2,2,3,3,4,4,4-nonafluoro-, ammonium salt (1:1) |
| 68259-11-0 | Pentanoic acid, 2,2,3,3,4,4,5,5,5-nonafluoro-, ammonium salt (1:1) |
| 68298-12-4 | 1-Butanesulfonamide, 1,1,2,2,3,3,4,4,4-nonafluoro-N-methyl- |
| 68298-79-3 | Poly(oxy-1,2-ethanediyl), alpha-[2-[ethyl[(1,1,2,2,3,3,4,4,4-nonafluorobutyl)sulfonyl]amino]ethyl]-omega-hydroxy- |
| 68310-18-9 | Poly[oxy(methyl-1,2-ethanediyl)], alpha-[2-[ethyl[(1,1,2,2,3,3,4,4,4-nonafluorobutyl)sulfonyl]amino]ethyl]-omega-hydroxy- |

| CAS | Chemical Name |
|-------------|---|
| 68555-77-1 | 1-Butanesulfonamide, N-[3-(dimethylamino)propyl]-1,1,2,2,3,3,4,4,4-nonafluoro- |
| 68891-05-4 | Ethene, tetrafluoro-, homopolymer, α -fluoro- ω -(2-hydroxyethyl)-, citrate, reaction products with 1,6-diisocyanatohexane |
| 69087-47-4 | Propanoic acid, 3-[1-[difluoro[(1,2,2-trifluoroethenyl)oxy]methyl]-1,2,2,2-tetrafluoroethoxy]-2,2,3,3-tetrafluoro-, polymer with 1,1,2,2-tetrafluoroethene |
| 69116-73-0 | Propanoic acid, 3-[1-[difluoro[1,2,2,2-tetrafluoro-1-(fluorocarbonyl)ethoxy]methyl]-1,2,2,2-tetrafluoroethoxy]-2,2,3,3-tetrafluoro-, methyl ester |
| 69804-19-9 | Perfluoro(3-(1-(ethenyloxy)propan-2-yloxy)propanenitrile) |
| 69991-61-3 | Ethene, 1,1,2,2-tetrafluoro-, oxidized, polymd. |
| 69991-62-4 | Ethene, 1,1,2,2-tetrafluoro-, oxidized, polymd., reduced |
| 69991-67-9 | 1-Propene, 1,1,2,3,3,3-hexafluoro-, oxidized, polymd. |
| 70225-18-2 | 1-Butanesulfonic acid, 1,1,2,2,3,3,4,4,4-nonafluoro-, compd. with 2,2'-iminobis[ethanol] (1:1) |
| 71832-66-1 | Propanenitrile, 3-[1-[difluoro[(1,2,2-trifluoroethenyl)oxy]methyl]-1,2,2,2-tetrafluoroethoxy]-2,2,3,3-tetrafluoro-, polymer with 1,1,2,2-tetrafluoroethene and 1,1,2-trifluoro-2-(trifluoromethoxy)ethene |
| 74398-72-4 | 1-Butene, 4-bromo-3,3,4,4-tetrafluoro-, polymer with 1,1-difluoroethene, 1,1,2,3,3,3-hexafluoro-1-propene and 1,1,2,2-tetrafluoroethene |
| 74499-71-1 | 1-Propene, 1,1,2,3,3,3-hexafluoro-, polymer with ethene, 1,1,1,2,2,3,3-heptafluoro-3-[(1,2,2-trifluoroethenyl)oxy]propane and 1,1,2,2-tetrafluoroethene |
| 79070-11-4 | Poly(difluoromethylene), α -chloro- ω -(2,2-dichloro-1,1,2-trifluoroethyl)- |
| 82382-12-5 | Sodium perfluorohexanesulfonate (PFHxS-Na) |
| 86508-42-1 | Perfluoro compounds, C5-18 |
| 88645-29-8 | Ethene, 1,1,2,2-tetrafluoro-, oxidized, polymd., reduced, Me esters, reduced |
| 101316-90-9 | Ethene, 1,1,2,2-tetrafluoro-, oxidized, polymd., reduced, Me esters, reduced, acrylates |

| CAS | Chemical Name |
|-------------|---|
| 125061-94-1 | Naphthalene, [difluoro(1,2,2,3,3,4,4,5,5,6,6-undecafluorocyclohexyl)methyl]heptafluorodecahydro- |
| 126066-30-6 | Poly[oxy(trifluoro(trifluoromethyl)-1,2-ethanediyl)], α -[1,2,2,2-tetrafluoro-1-(hydroxymethyl)ethyl]- ω -[tetrafluoro(trifluoromethyl)ethoxy]- |
| 132182-92-4 | Pentane, 1,1,1,2,2,3,4,5,5,5-decafluoro-3-methoxy-4-(trifluoromethyl)- |
| 134035-61-3 | Poly[oxy(trifluoro(trifluoromethyl)-1,2-ethanediyl)], α -[1,2,2,2-tetrafluoro-1-(methoxycarbonyl)ethyl]- ω -[tetrafluoro(trifluoromethyl)ethoxy]- |
| 147545-41-3 | 1-Butanesulfonamide, 1,1,2,2,3,3,4,4,4-nonafluoro-N-(2-hydroxyethyl)-N-methyl-, phosphate (ester) |
| 149935-01-3 | 1-Propene, 1,1,2,3,3,3-hexafluoro-, polymer with 1,1-difluoroethene, ethene, 1,1,2,2-tetrafluoroethene and 1,1,2-trifluoro-2-(trifluoromethoxy)ethene |
| 156559-18-1 | 2-Oxiranemethanol, polymers with reduced Me esters of reduced polymd. oxidized tetrafluoroethylene |
| 161075-12-3 | Ethene, tetrafluoro-, oxidized, polymd., reduced, Me esters |
| 162492-15-1 | Ethene, 1,1,2,2-tetrafluoro-, oxidized, polymd., reduced, Me esters, reduced, ethoxylated |
| 163702-05-4 | Butane, 1-ethoxy-1,1,2,2,3,3,4,4,4-nonafluoro- |
| 163702-06-5 | Propane, 2-(ethoxydifluoromethyl)-1,1,1,2,3,3,3-heptafluoro- |
| 163702-07-6 | Butane, 1,1,1,2,2,3,3,4,4-nonafluoro-4-methoxy- |
| 163702-08-7 | Propane, 2-(difluoromethoxymethyl)-1,1,1,2,3,3,3-heptafluoro- |
| 165178-32-5 | Propane, 1,1,1,2,2,3,3-heptafluoro-3-[(1,2,2-trifluoroethenyl)oxy]-, polymer with 1,1,2,2-tetrafluoroethene and 1,1,2-trifluoro-2-(trifluoromethoxy)ethene |
| 177484-43-4 | Propanenitrile, 2,3,3,3-tetrafluoro-2-[1,1,2,2,3,3-hexafluoro-3-[(1,2,2-trifluoroethenyl)oxy]propoxy]-, polymer with 1,1,2,2-tetrafluoroethene and 1,1,2-trifluoro-2-(trifluoromethoxy)ethene |
| 185701-88-6 | Propanoyl fluoride, 2,3,3,3-tetrafluoro-2-[1,1,2,3,3,3-hexafluoro-2-(1,1,2,2,3,3,3-heptafluoropropoxy)propoxy]-, polymer with 2,2,3-trifluoro-3-(trifluoromethyl)oxirane, reaction products with 3-(ethenyldimethylsilyl)-N-methylbenzenamine |

| CAS | Chemical Name |
|-------------|--|
| 200013-65-6 | Diphosphoric acid, polymers with ethoxylated reduced Me esters of reduced polymd. oxidized tetrafluoroethylene |
| 212335-64-3 | 2-Propenoic acid, reaction products with N-[3-(dimethylamino)propyl]-1,1,2,2,3,3,4,4,4-nonafluoro-1-butanefulfonamide |
| 220075-01-4 | Propanedioic acid, 2-(3,3,4,4,5,5,6,6,7,7,8,8,8-tridecafluorooctyl)-, 1,3-dimethyl ester |
| 220182-27-4 | 1-Propene, 1,1,2,3,3,3-hexafluoro-, telomer with chlorotrifluoroethene, oxidized, reduced, Et ester, hydrolyzed |
| 220459-70-1 | Glycine, N,N-bis[2-hydroxy-3-(2-propen-1-yloxy)propyl]-, sodium salt (1:1), reaction products with ammonium hydroxide and 1,1,1,2,2-pentafluoro-2-iodoethane-tetrafluoroethylene telomer |
| 220689-12-3 | Phosphonium, tetrabutyl-, 1,1,2,2,3,3,4,4,4-nonafluoro-1-butanefulfonate (1:1) |
| 226409-30-9 | Propanedioic acid, 2-(3,3,4,4,5,5,6,6,7,7,8,8,8-tridecafluorooctyl)-, 1,3-bis[4-(ethenyloxy)butyl] ester |
| 274917-93-0 | Ethene, tetrafluoro-, oxidized, polymd., reduced, decarboxylated, C3 fraction |
| 274917-94-1 | Ethene, tetrafluoro-, oxidized, polymd., reduced, decarboxylated, C4 fraction |
| 274917-95-2 | Ethene, tetrafluoro-, oxidized, polymd., reduced, decarboxylated, C5 fraction |
| 274917-96-3 | Ethene, tetrafluoro-, oxidized, polymd., reduced, decarboxylated, C6 fraction |
| 274917-97-4 | Ethene, tetrafluoro-, oxidized, polymd., reduced, decarboxylated, C7 fraction |
| 274918-01-3 | Ethene, tetrafluoro-, oxidized, polymd., reduced, decarboxylated, C8 fraction |
| 274918-02-4 | Ethene, tetrafluoro-, oxidized, polymd., reduced, decarboxylated, C9 fraction |
| 274918-03-5 | Ethene, tetrafluoro-, oxidized, polymd., reduced, decarboxylated, C10 fraction |
| 274918-09-1 | Ethene, tetrafluoro-, oxidized, polymd., reduced, decarboxylated, C11 fraction |

| CAS | Chemical Name |
|--------------|--|
| 274918-10-4 | Ethene, tetrafluoro-, oxidized, polymd., reduced, decarboxylated, C12 fraction |
| 274918-12-6 | Ethene, tetrafluoro-, oxidized, polymd., reduced, decarboxylated, C13 fraction |
| 297730-93-9 | Hexane, 3-ethoxy-1,1,1,2,3,4,4,5,5,6,6,6-dodecafluoro-2-(trifluoromethyl)- |
| 328389-90-8 | 1,2-Propanediol, 3-(diethylamino)-, polymers with 5-isocyanato-1 |
| 332350-90-0 | Phosphonium, tributyl(2-methoxypropyl)-, salt with 1,1,2,2,3,3,4,4,4-nonafluoro-N-methyl-1-butanefulfonamide (1:1) |
| 332350-93-3 | Phosphonium, triphenyl(phenylmethyl)-, salt with 1,1,2,2,3,3,4,4,4-nonafluoro-N-methyl-1-butanefulfonamide (1:1) |
| 421595-49-5 | 2-Propenoic acid, 2-hydroxyethyl ester, adduct with 5-isocyanato-1-(isocyanatomethyl)-1,3,3-trimethylcyclohexane (1:1), reaction products with ethoxylated reduced Me esters of reduced polymd. oxidized tetrafluoroethylene |
| 425670-75-3 | 6:2 Fluorotelomer sulfonate anion |
| 452080-67-0 | Boron, trifluoro(tetrahydrofuran)-, (T-4)-, polymer with 3-methyl |
| 475678-78-5 | Oxetane, 3-methyl-3-[[[(3,3,4,4,5,5,6,6,6-nonafluorohexyl)oxy]methyl]- |
| 484024-67-1 | 1-Butanesulfonamide, 1,1,2,2,3,3,4,4,4-nonafluoro-N-(2-hydroxyethyl)-, ammonium salt (1:1) |
| 502164-17-2 | Ethene, 1,1,2,2-tetrafluoro-, oxidized, polymd., reduced, Et esters |
| 753501-40-5 | Boron, trifluoro(tetrahydrofuran)-, (T-4)-, polymer with 3-methyl-3-[(|
| 753501-43-8 | Boron, trifluoro(tetrahydrofuran)-, (T-4)-, polymer with .alpha.-hy |
| 864910-70-3 | Boron, trifluoro(tetrahydrofuran)-, (T-4)-, polymer with 2-methy |
| 878545-84-7 | 1-Propene, 1,1,2,3,3,3-hexafluoro-, polymer with 1,1,2,2-tetrafluoroethene, 1,1,2-trifluoro-2-(1,1,2,2,2-pentafluoroethoxy)ethene and 1,1,2-trifluoro-2-(trifluoromethoxy)ethene |
| 957209-18-6 | Furan, 2,3,3,4,4-pentafluorotetrahydro-5-methoxy-2,5-bis[1,2,2,2-tetrafluoro-1-(trifluoromethyl)ethyl]- |
| 1224429-82-6 | Phosphoric acid, mixed esters with polyethylene glycol and 3,3,4,4,5,5,6,6,7,7,8,8,8-tridecafluoro-1-octanol, ammonium salts |

| CAS | Chemical Name |
|--------------|--|
| 1370442-66-2 | Iodonium, diphenyl-, 4,4'-di-C10-13-alkyl derivs., (OC-6-11)-hexafluoroantimonates(1-) |
| 1092822-31-5 | 2-Propenoic acid, 2-methyl-, dodecyl ester, polymer with 2-hyd |
| 1269217-82-4 | Thieno[3,4-b]thiophene, homopolymer, 2-[1-[difluoro[(1,2,2-trifluoroethenyl)oxy]methyl]-1,2,2,2-tetrafluoroethoxy]-1,1,2,2-tetrafluoroethanesulfonic acid-tetrafluoroethylene polymer-doped |
| 1279108-20-1 | Hexane, 1,6-diisocyanato-, homopolymer, α -[1-[[[3-[[3-(dimethylamino)propyl]amino]propyl]amino]carbonyl]-1,2,2,2-tetrafluoroethyl]- ω -(1,1,2,2,3,3,3-heptafluoropropoxy)poly[oxy(trifluoro(trifluoromethyl)-1,2-ethanediyl)]-blocked |
| 1029089-63-1 | Boron, trifluoro(tetrahydrofuran)-, (T-4)-, polymer with 3-methyl-3-((2,2,3,3,3-pentafluoropropoxy)methyl)oxetane, ether with 2,2-dimethyl-1,3-propanediol (2:1), polymer with α -hydro- ω -hydroxypoly(oxy-1,2-ethanediyl) and 5-isocyanato-1-(isocyanatomethyl)-1,3,3-trimethylcyclohexane |
| 1033385-42-0 | Poly[oxy(trifluoro(trifluoromethyl)-1,2-ethanediyl)], α -[1,2,2,2-tetrafluoro-1-[[2-hydroxyethyl]amino]carbonyl]ethyl]- ω -[tetrafluoro(trifluoromethyl)ethoxy]-, ether with α -hydro- ω -hydroxypoly(oxy-1,2-ethanediyl) (2:1) |
| 1214752-87-0 | Borate(1-), tetrahydro-, sodium (1:1), reaction products with reduced polymd. oxidized tetrafluoroethylene, hydrolyzed, diallyl ethers, polymers with 2,4,6,8-tetramethylcyclotetrasiloxane, Si-(8,13-dioxo-4,7,12-trioxa-9-azapentadec-14-en-1-yl) derivs. |
| 1378928-76-7 | Ethanesulfonyl fluoride, 2-[1-[difluoro][(1,2,2-trifluoroethenyl)oxy]methyl]-1,2,2,2-tetrafluoroethoxy]-1,1,2,2-tetrafluoro-, polymer with 1,1,2,2-tetrafluoroethene, hydrolyzed, potassium salts |
| 1378930-04-1 | Ethanesulfonyl fluoride, 2-[1-[difluoro[(1,2,2-trifluoroethenyl)oxy]methyl]-1,2,2,2-tetrafluoroethoxy]-1,1,2,2-tetrafluoro-, polymer with 1,1,2,2-tetrafluoroethene, hydrolyzed |
| 1378930-30-3 | Propanoic acid, 3-[1-[difluoro[(1,2,2-trifluoroethenyl)oxy]methyl]-1,2,2,2-tetrafluoroethoxy]-2,2,3,3-tetrafluoro-, methyl ester, polymer with 1,1,2,2-tetrafluoroethene, hydrolyzed, potassium salts |
| 1564254-27-8 | Ethene, 1,1,2,2-tetrafluoro-, oxidized, polymd., reduced, Me esters, reduced, N-(3-isocyanatomethylphenyl)carbamates |
| 1627515-87-0 | Hexanedioic acid, polymers with 1,3-butanediol, 1,4-butanediol, di-Et malonate, 1,6-diisocyanatohexane, ethoxylated reduced Me esters of |

| CAS | Chemical Name |
|--------------|---|
| | reduced polymd. oxidized tetrafluoroethylene, 1,6-hexanediol, 1,1'-methylenebis[isocyanatobenzene], propylene glycol a |
| 1687740-67-5 | Ethanesulfonyl fluoride, 1,1,2,2-tetrafluoro-2-[(1,2,2-trifluoroethenyl)oxy]-, polymer with 1,1,2,2-tetrafluoroethene, hydrolyzed, lithium salts |
| 1708962-18-8 | Methanol, reaction products with 1,1,1,2,2,3,4,5,5,6,6,7,7,7-tetradecafluoro-3-heptene |
| 1708962-19-9 | Methanol, reaction products with 1,1,1,2,3,4,4,5,5,6,6,7,7,7-tetradecafluoro-2-heptene |
| 1807944-82-6 | 1-Octanesulfonic acid, 3,3,4,4,5,5,6,6,7,7,8,8,8-tridecafluoro-, barium salt (2:1) |
| 2728655-42-1 | Alcohols, C8-16, γ - ω -perfluoro, reaction products with 1,6-diisocyanatohexane, glycidol and stearyl alc. |
| 2738952-61-7 | Acetamide, N-[3-(dimethylamino)propyl]-, 2-[(γ - ω -perfluoro-C4-20-alkyl)thio] derivs. |
| 2744262-09-5 | Acetic acid, 2-[(γ - ω -perfluoro-C4-20-alkyl)thio] derivs., 2-hydroxypropyl esters |
| 2742694-36-4 | Acetamide, N-(2-aminoethyl)-, 2-[(γ - ω -perfluoro-C4-20-alkyl)thio] derivs., polymers with N1,N1-dimethyl-1,3-propanediamine, epichlorohydrin and ethylenediamine, oxidized |
| 3030471-22-5 | Acetic acid, [(γ - ω -perfluoro-C8-10-alkyl)thio] derivs., Bu esters |

1045 Polychlorinated alkanes

Please see EPA's List of Toxic Chemicals within the Polychlorinated Alkanes Category and Guidance for Reporting for further guidance.

1035 Polycyclic Aromatic Compounds

Includes only the chemicals listed here.

| CAS | Chemical Name |
|---------|------------------------|
| 50-32-8 | Benzo(a)pyrene |
| 53-70-3 | Dibenzo(a,h)anthracene |
| 56-49-5 | 3-Methylcholanthrene |

| CAS | Chemical Name |
|-----------|--------------------------------|
| 56-55-3 | Benz(a)anthracene |
| 57-97-6 | 7,12-Dimethylbenz(a)anthracene |
| 189-55-9 | Benzo(r,s)pentaphene |
| 189-64-0 | Benzo(a,h)pyrene |
| 191-30-0 | Dibenzo(a,l)pyrene |
| 192-65-4 | Dibenzo(a,e)pyrene |
| 193-39-5 | Indeno[1,2,3-cd]pyrene |
| 194-59-2 | 7H-Dibenzo(c,g)carbazole |
| 205-99-2 | Benzo(b)fluoranthene |
| 205-82-3 | Benzo(j)fluoranthene |
| 206-44-0 | Benzo(j,k)fluorine |
| 207-08-9 | Benzo(k)fluoranthene |
| 218-01-9 | Benzo(a)phenanthrene |
| 224-42-0 | Dibenz(a,j)acridine |
| 226-36-8 | Dibenz(a,h)acridine |
| 3697-24-3 | 5-Methylchrysene |
| 5385-75-1 | Dibenzo(a,e)Fluoranthene |
| 5522-43-0 | 1-Nitropyrene |

1036 Selenium Compounds

Includes any unique chemical substance that contains selenium as part of the chemical's infrastructure.
Includes, but is not limited to:

| CAS | Chemical Name |
|-----------|---|
| 144-34-3 | Carbamodithioic Acid, dimethyl-,Tetraanhydrosulfid with Orthothioselenious Acid |
| 630-10-4 | Selenourea |
| 7446-08-4 | Selenium Dioxide |

| CAS | Chemical Name |
|------------|--------------------------------------|
| 7488-56-4 | Selenium sulfide |
| 7782-82-3 | Sodium Selenite |
| 7783-00-8 | Selenious Acid |
| 10102-18-8 | Sodium Selenite |
| 12039-52-0 | Selenious Acid, Dithallium (1+) Salt |

1037 Silver Compounds

Includes any unique chemical substance that contains silver as part of the chemical's infrastructure. Includes, but is not limited to:

| CAS | Chemical Name |
|-----------|--------------------------|
| 506-61-6 | Potassium Silver Cyanide |
| 506-64-9 | Silver Cyanide |
| 7761-88-8 | Silver Nitrate |

1070 Strychnine and Salts

Includes any unique chemical substance that contains strychnine or a strychnine salt as part of the chemical's infrastructure. Includes, but is not limited to:

| CAS | Chemical Name |
|---------|----------------------|
| 57-24-9 | Strychnine and Salts |

1038 Thallium compounds

Includes any unique chemical substance that contains thallium as part of the chemical's infrastructure. Includes, but is not limited to:

| CAS | Chemical Name |
|-----------|-------------------|
| 563-68-8 | Thallium Acetate |
| 1314-32-5 | Thallic Oxide |
| 6533-73-9 | Thallos Carbonate |
| 7446-18-6 | Thallium sulfate |
| 7791-12-0 | Thallium Chloride |

| CAS | Chemical Name |
|------------|--------------------------------------|
| 10031-59-1 | Thallium sulfate |
| 10102-45-1 | Thallium Nitrate |
| 12039-52-0 | Selenious Acid, dithallium (1+0 Salt |

1065 Vanadium Compounds

Includes any unique chemical substance that contains vanadium as part of the chemical's infrastructure. Includes, but is not limited to:

| CAS | Chemical Name |
|-----------|--------------------|
| 1314-62-1 | Vanadium Pentoxide |

1039 Zinc Compounds

Includes any unique chemical substance that contains zinc as part of the chemical's infrastructure. Includes, but is not limited to:

| CAS | Chemical Name |
|-----------|---|
| 127-82-2 | Zinc Phenolsulfonate |
| 137-30-4 | Zinc, Bis(dimethylcarbomodithiato-S,S)- |
| 557-21-1 | Zinc Cyanide |
| 557-34-6 | Zinc Acetate |
| 557-41-5 | Zinc Formate |
| 1314-84-7 | Zinc Phosphide |
| 1332-07-6 | Zinc Borate |
| 3486-35-9 | Zinc Carbonate |
| 7646-85-7 | Zinc Chloride |
| 7699-45-8 | Zinc Bromide |
| 7720-78-7 | Zinc Sulfate |
| 7779-86-4 | Zinc Hydrosulfite |
| 7779-88-6 | Zinc Nitrate |

| CAS | Chemical Name |
|------------|----------------------------------|
| 7783-49-5 | Zinc Fluoride |
| 14324-55-1 | Zinc,Bis(diethylcarbamoato-S,S)- |
| 14639-97-5 | Zinc Ammonium Chloride |
| 14639-98-6 | Zinc Ammonium Chloride |
| 16871-71-9 | Zinc Silicofluoride |
| 52628-25-8 | Zinc Ammonium Chloride |

Appendix C: Form S, Section 4: Toxics Use by Production Unit

This section provides guidance in completing Section 4 of the Form S. The purpose of Section 4 of the Form S is to indicate if use and/or byproduct increased or decreased by more than 10% compared to the previous reporting year, and if so, what lead to the change as indicated by TUR technique codes).

Four examples are presented, followed by a properly completed Form S and the correct solution for each example.

- Example 1: Production increase and chemical use in production unit and waste treatment operations
- Example 2: Increase in production and TUR implementation
- Example 3: Product reformulation and on-site recycling
- Example 4: Web coating improved cleaning operation with chemical substitution

Example #1 – Production increase and chemical use in production unit and waste treatment operations

Company ABC (Facility ID 70709) etches aluminum with sodium hydroxide and then anodizes the aluminum part using sulfuric acid (CAS 8014-95-7). For reporting year 2018 the company reported 120,000 pounds of sulfuric acid otherwise used, 50,000 pounds of that use was waste treatment pH neutralization and 70,000 pounds was used in anodizing (process code AA-18) in production unit #1. The company reported 50,000 pounds of byproduct for reporting year 2009 and 20,000 pounds of sulfuric acid consumed or transformed on line 2b of the Form S.

The company's Form S for sulfuric acid in reporting year 2009 is:

- | | | |
|-----|-------------|--|
| 1e. | 120,000 lbs | Otherwise used |
| 1f. | 50,000 lbs | Generated as Byproduct |
| 2b. | 20,000 lbs | Chemical was consumed or transformed |
| 3b. | 50,000 lbs | Amount of chemical used in waste treatment |

Assuming all process efficiencies stayed the same in reporting years 2018 and 2019, and the company did not implement TUR projects in reporting year 2019, how would the facility complete the reporting year 2019 Form S if they had a 14% increase in business production and used 80,000 pounds of sulfuric acid in production unit #1? Assume the company used 50,000 pounds of sulfuric acid in waste treatment in reporting year 2019 and it reported a facility-wide use of sulfuric acid of 130,000 pounds in reporting year 2019.

The company's Form S for sulfuric acid in reporting year 2019 is on the following page:



Toxics Use Report - Form S

Chemical Use Facility-Wide and by Production Units

2019
Reporting Year
ABC
Facility Name
70709
DEP Facility ID Number
Sulfuric Acid
Chemical Name

Section 1: Facility-Wide Use of Listed Chemical

Important: When filling out forms on the computer, use only the tab key to move your cursor - do not use the return key.

7664-93-9
a. MA DEP CAS #
Sulfuric Acid
b. Chemical Name (Dioxin should be in grams, decimal points may be used)

Facility-wide use of chemical identified in a. Enter the total amount (in POUNDS, except for dioxin) for each applicable category. **NOTE:** 'Generated as byproduct' (item f.) means all waste containing the listed chemical before the waste is handled, transferred, treated, recycled or released. Please refer to the reporting instructions before completing this section.

| | | |
|-----------------------------|------------------------------|----|
| c. Manufactured | d. Processed | |
| 130,000 | 57,143 | |
| e. Otherwise Used | f. Generated As Byproduct | |
| | | h. |
| g. Shipped In Or As Product | Production or Activity Ratio | |

Section 2: Materials Balance

When the amounts reported in c, d and e in Section 1 are added together, the sum will in many cases equal the sum of f and g. In other words, lines c, d and e will often form a "materials balance." If lines c, d and e are not in approximate balance, you must use this section to explain why. Indicate all the reasons that apply by entering the number of pounds on the appropriate line below (e.g., 4,000 Chemical was held in inventory).

| | |
|-----------------------------------|---|
| | 22,857 |
| a. Chemical Was Recycled On Site | b. Chemical Was Consumed Or Transformed |
| c. Chemical Was Held In Inventory | d. Chemical Is A Compound |
| e. Other | |

f. Did anything non-routine occur at your facility during the reporting year that affected the data reported?
 Yes* No *If your answer is Yes, you may explain in Section 4.m. on Page 3.

Section 3: Chemicals Used in Waste Treatment Units

a. Is this chemical used to treat waste or control pollution?
 Yes No* *If your answer is No, please skip ahead to Section 4.

b. Please enter the amount of the chemical (in pounds) used to treat waste or control pollution.
 50,000
 Pounds



Toxics Use Report - Form S

Chemical Use Facility-Wide and by Production Units

2019
Reporting Year
ABC
Facility Name
70709
DEP Facility ID Number
Sulfuric Acid
Chemical Name

Section 3: Chemicals Used in Waste Treatment Units (continued)

c. Did the use of this chemical for waste treatment or pollution control increase or decrease by 10 percent or more compared with the previous reporting year?

c.1 Yes* No
c.2 Yes No

*If your answer is Yes, you may explain in Section 4.m. on Page 3.

Are there more chemicals to report? (Use ONLY if ALL chemicals are used to treat waste or control pollution.)

Section 4: Toxics Use by Production Unit

1

a Production Unit #

Use

b. Quantity of Chemical Code:

1. ≤5,000 lbs. 2. > 5,000 ≤10,000 lbs. 3. > 10,000 lbs. ≤100,000 lbs.
 4. > 100,000 lbs. ≤500,000 lbs. 5. > 500,000 lbs.

c. Did the use of this chemical in this production unit increase or decrease by 10 percent or more compared with the previous reporting year and/or did you implement toxics use reduction?

Yes No* *If your answer is No, skip ahead to g. below.

| | | | | |
|---------------|---------|-----------|-----|-----|
| AA-18 d.1. | 1 2. | 68 3a. | 3b. | 3c. |
| e.1. | 2. | 3a. | 3b. | 3c. |
| f.1. | 2. | 3a. | 3b. | 3c. |

Byproduct

g. Was byproduct generated for this chemical less than 1 percent of use in this production unit?

Yes* No *If your answer is Yes, skip ahead to m. on Page 3.

h. Did the byproduct generated for this chemical in this production unit increase or decrease by 10 percent or more compared with the previous reporting year and/or did you implement toxics use reduction?

Yes No* *If your answer is No, skip ahead to m. on Page 3.

| | | | | |
|---------------|---------|-----------|-----|-----|
| AA-18 i.1. | 1 2. | 68 3a. | 3b. | 3c. |
| j.1. | 2. | 3a. | 3b. | 3c. |
| k.1. | 2. | 3a. | 3b. | 3c. |

l. Are there more production units that use this chemical? Yes No

m. You may add any comments or explanations regarding chemical use and/or byproduct generated in this production unit, chemical use in waste treatment (from Section 3), and non-routine occurrences at your facility (from Section 2).

Solution for Problem #1:

Reporting Year: **2019**

Facility Name: **Company ABC**

DEP Facility ID Number: **70709**

Chemical Name: **Sulfuric Acid**

Section 1: Facility wide use of Listed Chemical

1a. **9014-95-7**

1b. **Sulfuric Acid**

1e. **130,000 lbs** **Otherwise Used** **(given)**

1f. **57,143 lbs** **Generated as Byproduct**

(50,000 lbs byproduct 2009/70,000 lbs used in anodizing 2018)*(80,000 lbs used in anodizing 2018) = 57,143 lbs of byproduct 2019

This calculation is based on the statement in the problem that “...all process efficiencies stayed the same in 2018 and 2019...”

Section 2: Materials Balance

2b. **22,860 lbs** **Chemical Was Consumed or Transformed**

80,000 lbs used in anodizing – 57,143 lbs byproduct = 22,857 lbs consumed or transformed

2f. **No**

Section 3: Chemicals Used in Waste Treatment Units

3a. **Yes**

3b. **50,000 lbs (given)**

3c. **No.**

Section 4: Toxics Use by Production Unit

4a. Production Unit #1

4b. 3. >10,000 lbs. ≤100,000 lbs.

4c. Yes.

Formula: If:

$(\text{previous year's use}) * 0.9 < (\text{reporting year's use}) < (\text{previous year's use}) * 1.1$

Then: the use of the chemical did not change by 10%.

2018 use (70,000 lbs) * 1.1 = 77,000 lbs

2018 use (70,000 lbs) * 0.9 = 63,000 lbs

2019 Use = 80,000 lbs which is a greater than 10% increase.

4d1. AA-18

4d2. I

4d3a. 68 (Production increased)

4g. No.

4h. Yes.

Formula: If:

$(\text{previous year's byproduct generation}) * 0.9 < (\text{reporting year's byproduct generation}) < (\text{previous year's byproduct generation}) * 1.1$

Then: byproduct generation of the chemical did not change by 10%.

2018 byproduct generation (50,000 lbs) * 1.1 = 55,000 lbs

2018 byproduct generation (50,000 lbs) * 0.9 = 45,000 lbs

2019 byproduct generation = 57,143 lbs which is a greater than 10% increase.

4i1. AA-18.

4i2. I

4i3. 68 (Production increased)

4l. No

Example #2: Increase in production and TUR implementation

Boards Etc. (Facility ID 9763459) is a contract circuit board assembler. It attaches customer specified components on customer supplied circuit board via wave soldering (process code CC-08) in production unit #1. In reporting year 2018, it used tin-lead solder that contained 3,436 pounds of lead (CAS 7439-92-1), a TURA reportable substance. That same year the company sent 6,090 pounds of solder dross off-site for recycling and received a statement back from its recycler that 1,855 pounds of lead were recovered from the dross, after having removed 140 pounds of lead oxide. Results of engineering estimates show that 2.3 pounds of lead were released as an air point source and 1,448 pounds of lead were applied to customer circuit boards and shipped with products.

The company's Form S for lead and lead compounds, reported as lead compounds in reporting year 2018 is:

| | | |
|-----|-------------|-------------------------------------|
| 1c | 140 lbs | Manufactured (lead oxide) |
| 1d. | 3,436 lbs | Processed (lead) |
| 1f. | 1,987.5 lbs | Generated as Byproduct (lead oxide) |
| 1g. | 1,448 lbs | Shipped in or as product |

In reporting year 2019 the company purchased and processed 3,354 pounds of lead in their solder. During that same reporting year, it processed 10% more circuit boards than in reporting year 2018 and implemented a dross control program that reduced dross generation and recoverable lead was reported as 1,585 pounds. Engineering estimates indicate 2.5 pounds of lead were released to the air as a point source.

Data:

Dross Composition from 63 Sn/37 Pb Solder, after dross control program.

| | |
|-------------------|--------------------------|
| Lead | 30% (recoverable) |
| Tin | 44% |
| Lead Oxide | 3% |
| Tin Oxide | 22% |

Note: Reporting triggered for both lead and lead compounds reported with single Form S/Form R for lead compounds.

The company's Form S for lead compounds in reporting year 2019 is on the following page:



Toxics Use Report - Form S

Chemical Use Facility-Wide and by Production Units

2019
Reporting Year
Boards, etc.
Facility Name
9763459
DEP Facility ID Number
Lead Compounds
Chemical Name

Section 1: Facility-Wide Use of Listed Chemical

Important: When filling out forms on the computer, use only the tab key to move your cursor - do not use the return key.

| | |
|---|--|
| 1026 a. MADEP CAS # | Lead Compounds b. Chemical Name (Dioxin should be in grams, decimal points may be used) |
| Facility-wide use of chemical identified in a. Enter the total amount (in POUNDS, except for dioxin) for each applicable category. NOTE: 'Generated as byproduct' (item f.) means all waste containing the listed chemical before the waste is handled, transferred, treated, recycled or released. Please refer to the reporting instructions before completing this section. | |
| 158.5 c. Manufactured | 3,354 d. Processed |
| e. Otherwise Used | 1734.5 f. Generated As Byproduct |
| 1,619.5 g. Shipped In Or As Product | h. Production or Activity Ratio |

Section 2: Materials Balance

When the amounts reported in c, d and e in Section 1 are added together, the sum will in many cases equal the sum of f and g. In other words, lines c, d and e will often form a "materials balance." If lines c, d and e are not in approximate balance, you must use this section to explain why. Indicate all the reasons that apply by entering the number of pounds on the appropriate line below (e.g., 4,000 Chemical was held in inventory).

| | |
|---------------------------------------|--|
| a. Chemical Was Recycled On Site | 147 b. Chemical Was Consumed Or Transformed |
| c. Chemical Was Held In Inventory | 11.5 d. Chemical Is A Compound |
| e. Other | |

f. Did anything non-routine occur at your facility during the reporting year that affected the data reported?

Yes* No *If your answer is Yes, you may explain in Section 4.m. on Page 3.

Section 3: Chemicals Used in Waste Treatment Units

a. Is this chemical used to treat waste or control pollution?

Yes No* *If your answer is No, please skip ahead to Section 4.

b. Please enter the amount of the chemical (in pounds) used to treat waste or control pollution.

Pounds

Section 3: Chemicals Used in Waste Treatment Units (continued)

c. Did the use of this chemical for waste treatment or pollution control increase or decrease by 10 percent or more compared with the previous reporting year?



Toxics Use Report - Form S

Chemical Use Facility-Wide and by Production Units

2019
Reporting Year
Boards, etc.
Facility Name
9763459
DEP Facility ID Number
Lead Compounds
Chemical Name

- c.1. Yes* No
c.2. Yes No

*If your answer is Yes, you may explain in Section 4.m. on Page 3.
Are there more chemicals to report? (Use ONLY if ALL chemicals are used to treat waste or control pollution.)

Section 4: Toxics Use by Production Unit

1
a. Production Unit #

Use

b. Quantity of Chemical Code:

1. ≤5,000 lbs. 2. > 5,000 ≤10,000 lbs. 3. > 10,000 lbs. ≤100,000 lbs.
 4. > 100,000 lbs. ≤500,000 lbs. 5. > 500,000 lbs.

c. Did the use of this chemical in this production unit increase or decrease by 10 percent or more compared with the previous reporting year and/or did you implement toxics use reduction?

- Yes No* *If your answer is No, skip ahead to g. below.

| Process code(s) where most significant changes occurred (up to three in descending order) | Type of Change (Enter "I" for Increase, "D" for Decrease) | Technique Code(s) (up to three per process code) | | |
|--|--|---|-----|-----|
| CC-08 | D | 50 | 68 | |
| d.1. | 2. | 3a. | 3b. | 3c. |
| e.1. | 2. | 3a. | 3b. | 3c. |
| f.1. | 2. | 3a. | 3b. | 3c. |

Byproduct

g. Was byproduct generated for this chemical less than 1 percent of use in this production unit?

- Yes* No *If your answer is Yes, skip ahead to m. on Page 3.

h. Did the byproduct generated for this chemical in this production unit increase or decrease by 10 percent or more compared with the previous reporting year and/or did you implement toxics use reduction?

- Yes No* *If your answer is No, skip ahead to m. on Page 3.

| Process code(s) where most significant changes occurred (up to three in descending order) | Type of Change (Enter "I" for Increase, "D" for Decrease) | Technique Code(s) (up to three per process code) | | |
|--|---|---|-----------|---------|
| CC-08 l.1. | D 2. | 50 3a. | 68 3b. | 3c. |
| j.1. | 2. | 3a. | 3b. | 3c. |
| k.1. | 2. | 3a. | 3b. | 3c. |

l. Are there more production units to report? Yes No

m. You may add any comments or explanations regarding chemical use and/or byproduct generated in this production unit, chemical use in waste treatment (from Section 3), and non-routine occurrences at your facility (from Section 2).

Please note that lead use and byproduct generation decreased (by 2% and 13%, respectively), while production increased by 10%. We recycle our lead dross off-site.

Solution for Problem #2

Reporting Year: **2019**

Facility Name: **Boards, Etc.**

DEP Facility ID Number: **009-76-3459**

Chemical Name: **Lead Compounds**

Section 1: Facility wide use of Listed Chemical

1a. 1026

1b. Lead Compounds

1c. 158.5 lbs Manufactured (PbO - Lead Oxide)

From dross composition 3% lead oxide 30% lead

0.03 lb PbO/0.30 lb Pb x 1585 lbs Pb recovered from dross = 158.5 lbs PbO Lead Oxide

** Note that amount manufactured is reported by the compound weight and not the base metal weight.

1d. 3,354 lbs Lead (given)

1f. 1734.5 lb Lead Byproduct (to be reported as base metal lead – Pb)

1732 lbs lead in dross [1585 lb (recoverable lead in dross, given) + 147 lb (base metal lead in lead oxide in dross)]+ 2.5 lb lead (air emissions, given) = 1734.5 lb Pb

Note: Base metal lead content of lead oxide in dross is 93% based on molecular weight.

$$158.5 \text{ lbs PbO} \times 0.93 \text{ lb Pb/lb PbO} = 147 \text{ lb Lead}$$

1g. 1619.5 lb Lead Shipped in or as Product (to be reported as base metal lead – Pb)

Input – Byproduct = Product

$$3,354 \text{ lb Pb (input)} - 1734.5 \text{ lb Pb (byproduct)} = 1,619.5 \text{ lb Pb}$$

Section 2: Materials Balance

2b. 147 lbs.

Adjustment to material balance for amount of lead base metal reported as both processed and manufactured.

2d. 11.5 lbs.

Adjustment to material balance for amount of manufactured compound weight that is not base metal. $158.5 \text{ lb PbO} - 147 \text{ lb Pb} = 11.5 \text{ lb}$

2f No

Section 3: Chemicals Used in Waste Treatment Units

3a No

Section 4: Toxics Use by Production Unit

4a. Production Unit #1

4b. 1. ≤ 5,000 lbs.

4c. Yes– Toxics use reduction was implemented.

Formula: If:

$(\text{previous year's use}) * 0.9 < (\text{reporting year's use}) < (\text{previous year's use}) * 1.1$
Then: the use of the chemical did not change by 10%.

2018 use (3,436 lbs) * 1.1 = 3,779.6 lbs

2018 use (3,436 lbs) * 0.9 = 3,092.4 lbs

2019 Use = 3,354 lb, so use did not change by more than 10%, however, toxics use reduction was implemented in the form of a dross control program.

4d1. CC-08

4d2. D

4d3a. 50 (Improved Operations and Maintenance), 68 (Production increased)

4g. No.

4h. Yes. (Toxics use reduction was implemented AND byproduct generation decreased by more than 10%).

Formula: If:

$(\text{previous year's byproduct generation}) * 0.9 < (\text{reporting year's byproduct generation}) < (\text{previous year's byproduct generation}) * 1.1$
Then: byproduct generation of the chemical did not change by 10%.

2018 byproduct generation (1,987.5 lbs) * 1.1 = 2,186.25 lbs

2018 byproduct generation (1,987.5 lbs) * 0.9 = 1,788.75 lbs

2019 byproduct generation = 1,734.5 lbs.

4i1. CC-08.

4i2. D

4i3. 50 (Improved Operations and Maintenance), 68 (Production increased)

4l. No.

4m. Please note that lead use and byproduct generation decreased (by 2% and 13%, respectively), while production increased by 10%. We recycle our lead dross off-site.

Example #3 Product reformulation and on-site recycling

The Green Paint Company (Facility ID 745978) prides itself in the manufacture of environmentally friendly paints. It manufactures a line of VOC compliant solvent based paint in production unit #1 for use in metal finishing applications that contain xylene mixed isomers (CAS 1330-20-7). In reporting year 2018 it processed 126,541 pounds of xylene mixed isomers (including reclaimed solvent) and produced 56,237 gallons of metal finishing paint.

In the following reporting year 2019, the company manufactured/compounded (process code GG-01) a reformulated version of the metal finishing paint using a different resin that required the use of approximately 12% less xylene mixed isomers and no additional solvents. The company produced 58,116 gallons of the reformulated metal finishing paint using only 115,376 pounds of xylene mixed isomers. Fugitive emissions of xylene mixed isomers during processing operations were estimated at 1,135 pounds in reporting year 2018 and 1,098 pounds in reporting year 2019. The company has a non-integral on-site recycling solvent still (DD-02) that reclaimed approximately 800 pounds each year of xylene mixed isomers from processing operations. The amount of reclaimed xylene is included in the total facility-wide usage numbers stated above. The company shipped off-site 2 drums of hazardous waste in each year that it estimated contained a total of 250 pounds of xylene mixed isomers in reporting year 2018 and 225 pounds in reporting year 2019.

The company's Form S for xylene mixed isomers in reporting year 2018 is:

| | | |
|-----|-------------|-------------------------------|
| 1d. | 126,541 lbs | Processed |
| 1f. | 2,185 lbs | Generated as Byproduct |
| 1g | 125,156 lbs | Shipped in or as product |
| 2a. | 800 lbs | Chemical was recycled on site |

The company's Form S for xylene mixed isomers in reporting year 2019 is on the following page:



Toxics Use Report - Form S

Chemical Use Facility-Wide and by Production Units

2019
Reporting Year
Green Paint Company
Facility Name
745978
DEP Facility ID Number
Xylene (mixed isomers)
Chemical Name

Section 1: Facility-Wide Use of Listed Chemical

Important: When filling out forms on the computer, use only the tab key to move your cursor - do not use the return key.

1330-20-7
a. MA DEP CAS #

Xylene (mixed isomers)
b. Chemical Name (Dioxin should be in grams, decimal points may be used)

Facility-wide use of chemical identified in a. Enter the total amount (in POUNDS, except for dioxin) for each applicable category. **NOTE:** 'Generated as byproduct' (item f.) means all waste containing the listed chemical before the waste is handled, transferred, treated, recycled or released. Please refer to the reporting instructions before completing this section.

| | | |
|-------------------|---------|---------------------------------|
| c. Manufactured | 114,576 | d. Processed |
| e. Otherwise Used | 2,123 | f. Generated As Byproduct |
| 113,253 | | g. Shipped In Or As Product |
| | | h. Production or Activity Ratio |

Section 2: Materials Balance

When the amounts reported in c, d and e in Section 1 are added together, the sum will in many cases equal the sum of f and g. In other words, lines c, d and e will often form a "materials balance." If lines c, d and e are not in approximate balance, you must use this section to explain why. Indicate all the reasons that apply by entering the number of pounds on the appropriate line below (e.g., 4,000 Chemical was held in inventory).

| | | |
|-----|-----------------------------------|---|
| 800 | a. Chemical Was Recycled On Site | b. Chemical Was Consumed Or Transformed |
| | c. Chemical Was Held In Inventory | d. Chemical Is A Compound |
| | e. Other | |

f. Did anything non-routine occur at your facility during the reporting year that affected the data reported?

Yes* No *If your answer is Yes, you may explain in Section 4.m. on Page 3.

Section 3: Chemicals Used in Waste Treatment Units

a. Is this chemical used to treat waste or control pollution?

Yes No* *If your answer is No, please skip ahead to Section 4.

b. Please enter the amount of the chemical (in pounds) used to treat waste or control pollution.

Pounds



Toxics Use Report - Form S

Chemical Use Facility-Wide and by Production Units

2019

Reporting Year

Green Paint Company

Facility Name

745978

DEP Facility ID Number

Xylene (mixed isomers)

Chemical Name

Section 3: Chemicals Used in Waste Treatment Units (continued)

c. Did the use of this chemical for waste treatment or pollution control increase or decrease by 10 percent or more compared with the previous reporting year?

c.1 Yes* No *If your answer is Yes, you may explain in Section 4.m. on Page 3.

c.2 Yes No Are there more chemicals to report? (Use ONLY if ALL chemicals are used to treat waste or control pollution.)

Section 4: Toxics Use by Production Unit

1

a. Production Unit #

Use

b. Quantity of Chemical Code:

1. ≤5,000 lbs. 2. > 5,000 ≤10,000 lbs. 3. > 10,000 lbs. ≤100,000 lbs.
 4. > 100,000 lbs. ≤500,000 lbs. 5. > 500,000 lbs.

c. Did the use of this chemical in this production unit increase or decrease by 10 percent or more compared with the previous reporting year and/or did you implement toxics use reduction?

Yes No* *If your answer is No, skip ahead to g. below.

Process code(s) where most significant changes occurred (up to three in descending order)

Type of Change (Enter "I" for Increase, "D" for Decrease)

Technique Code(s) (up to three per process code)

GG-01

D

20

d.1.

2.

3a.

3b.

3c.

e.1.

2.

3a.

3b.

3c.

f.1.

2.

3a.

3b.

3c.

Byproduct

g. Was byproduct generated for this chemical less than 1 percent of use in this production unit?

Yes* No *If your answer is Yes, skip ahead to m. on Page 3.

h. Did the byproduct generated for this chemical in this production unit increase or decrease by 10 percent or more compared with the previous reporting year and/or did you implement toxics use reduction?

Yes No* *If your answer is No, skip ahead to m. on Page 3.

| Process code(s) where most significant changes occurred (up to three in descending order) | Type of Change (Enter "I" for Increase, "D" for Decrease) | Technique Code(s) (up to three per process code) | | |
|--|--|---|---------|---------|
| GG-01 l.1. | D 2. | 20 3a. | 3b. | 3c. |
| j.1. | 2. | 3a. | 3b. | 3c. |
| k.1. | 2. | 3a. | 3b. | 3c. |

l. Are there more production units that use this chemical? Yes No

m. You may add any comments or explanations regarding chemical use and/or byproduct generated in this production unit, chemical use in waste treatment (from Section 3), and non-routine occurrences at your facility (from Section 2).

The use and byproduct generation of xylene (mixed isomers) decreased even with an increase in business. We reformulated our metal finishing line of paint that requires the use of approximately 12% less xylene per gallon of paint produced.

Example #3:

Reporting Year: **2019**

Facility Name: **Green Paint Company**

DEP Facility ID Number: **745978**

Chemical Name: **Xylene mixed isomers**

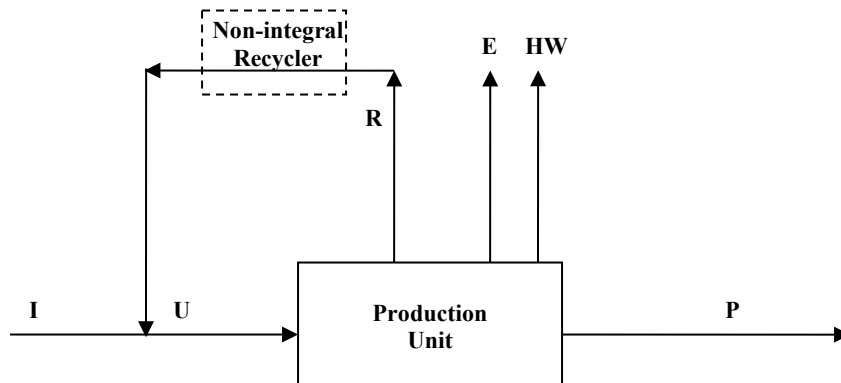
Section 1: Facility wide use of Listed Chemical

1a. **1330-20-7**

1b. **Xylene mixed isomers**

1d. **114,576 lbs** **Processed** (as purchased and non-integral recycle)

1f. **2,123 lbs** **Generated as Byproduct**



I = Initial input = 115,376 lbs used – 800 lbs recycled = 114,576 lbs. It states in the problem that “The amount of reclaimed xylene is included in the total facility-wide usage numbers stated above” – therefore, the amount of non-recycled xylene must be less than that used.

U = Used at facility = 115,376 lbs (given in problem)

P = Amount shipped in product = 115,376 lbs used (U) – 1,098 lbs fugitive emissions(E) – 225 lbs hazardous waste (HW) = 114,043 lbs

HW = Hazardous Waste = 225 lbs disposed of in drums

E = Fugitive emissions = 1,098 lbs

R = Non-integrally recycled xylene = 800 lbs

Total byproduct = 800 lbs (recovered by non-integral onsite recycling) + 1,098 lbs released as fugitive emissions + 225 lbs hazardous waste = 2,123 lbs

1g. 113,253 lbs Shipped In or As Product

114,576 lbs (I) – 1,098 lbs fugitive emissions – 225 lbs hazardous waste = 113,253 lbs.

Section 2: Materials Balance

2a. **800 lbs** **Chemical Was Recycled Onsite**

2f. **No**

Section 3: Chemicals Used in Waste Treatment Units

3a. **No**

Example 4: Toxics Use by Production Unit

- 4a. Production Unit #1
- 4b. 4. > 100,000 lbs. ≤ 500,000 lbs.
- 4c. Yes – Toxics use reduction was implemented.

Formula: If:

$(\text{previous year's use}) * 0.9 < (\text{reporting year's use}) < (\text{previous year's use}) * 1.1$
Then: the use of the chemical did not change by 10%.

2018 use (126,541 lbs) * 1.1 = 139,195 lbs

2018 use (126,541 lbs) * 0.9 = 113,887 lbs

2019 Use = 115,376 lbs. However, toxics use reduction was implemented through product reformulation.

4d1. GG-01

4d2. D

4d3a. 20 (Product reformulation)

4g. No.

4h. Yes – Toxics use reduction was implemented.

Formula: If:

$(\text{previous year's byproduct generation}) * 0.9 < (\text{reporting year's byproduct generation}) < (\text{previous year's byproduct generation}) * 1.1$
Then: byproduct generation of the chemical did not change by 10%.

2018 byproduct generation (2,185 lbs) * 1.1 = 2404 lbs

2018 byproduct generation (2,185 lbs) * 0.9 = 1967 lbs

2019 byproduct generation = 2,123 lbs. However, toxics use reduction was implemented.

4i1. GG-01.

4i2. D

4i3. 20 (Product reformulation)

4l. No.

4m. The use and byproduct generation of xylene mixed isomers decreased even with an increase in business. We reformulated our metal finishing line of paint that requires the use of approximately 12% less xylene per gallon of paint produced.

Example #4 Web coating improved cleaning operation with chemical substitution

Web Coating PST Company (Facility ID 996492) offers an array of solvent-based coating services and products. The company uses a thermal oxidizer to destroy the half-dozen different VOCs the company uses to apply adhesives (process code AA-03) and apply other solvent-based coatings (process code AA-03). In reporting year 2009 the facility-wide usage of methyl ethyl ketone (MEK - CAS 78-93-3) was 226,541 pounds. It used 125,789 pounds of MEK in an adhesive (production unit #3) applied to 1.2 million square yards of product and the remaining 100,752 pounds of MEK in facility-wide equipment clean up (process code FF-01) operations (production unit #9).

The company's Form S for methyl ethyl ketone in reporting year 2018 is:

- 1e. 226,541 lbs Otherwise Use
- 1f. 226,541 lbs Byproduct

In reporting year 2019 the company implemented a number of changes to its equipment clean-up operations. It began substituting a non-reportable terpene-based alternative for clean-up of several different coatings. It adjusted the dams in the coater reservoir (process code AA-03) to decrease the amount of adhesive leaking past the dam, reducing clean-up needed. It also provided worker training on using mechanical scraping and wiping prior to solvent application in roller and equipment clean-up. The company will be evaluating the installation of a centralized cleaning unit and the possibility of on-site solvent recycling in reporting year 2019.

In reporting year 2019 the company used 123,642 pounds of MEK in production unit #3 and produced 1.16 million yards of product. It used only 61,267 pounds of MEK in clean-up operations, even though they produced a comparable amount of product facility-wide as in reporting year 2018. The most significant reductions of MEK in clean-up operations (production unit #9) in order of descending importance are: the use of a terpene cleaner alternative, dam adjustment, worker training, and better use of mechanical scrapers.

The company's Form S for methyl ethyl ketone in reporting year 2019 is on the following page:



Toxics Use Report - Form S

Chemical Use Facility-Wide and by Production Units

2019
Reporting Year
Web Coating PST Company
Facility Name
996492
DEP Facility ID Number
Methyl Ethyl Ketone
Chemical Name

Important: When filling out forms on the computer, use only the tab key to move your cursor - do not use the return key.

Section 1: Facility-Wide Use of Listed Chemical

78-93-3
a. MA DEP CAS #

Methyl Ethyl Ketone
b. Chemical Name (Dioxin should be in grams, decimal points may be used)

Facility-wide use of chemical identified in a. Enter the total amount (in POUNDS, except for dioxin) for each applicable category. **NOTE:** 'Generated as byproduct' (item f.) means all waste containing the listed chemical before the waste is handled, transferred, treated, recycled or released. Please refer to the reporting instructions before completing this section.

| | |
|-----------------------------|---------------------------------|
| c. Manufactured | d. Processed |
| 184,909 | 184,909 |
| e. Otherwise Used | f. Generated As Byproduct |
| g. Shipped In Or As Product | h. Production or Activity Ratio |

Section 2: Materials Balance

When the amounts reported in c, d and e in Section 1 are added together, the sum will in many cases equal the sum of f and g. In other words, lines c, d and e will often form a "materials balance." If lines c, d and e are not in approximate balance, you must use this section to explain why. Indicate all the reasons that apply by entering the number of pounds on the appropriate line below (e.g., 4,000 Chemical was held in inventory).

| | |
|-----------------------------------|---|
| a. Chemical Was Recycled On Site | b. Chemical Was Consumed Or Transformed |
| c. Chemical Was Held In Inventory | d. Chemical Is A Compound |
| e. Other | |

f. Did anything non-routine occur at your facility during the reporting year that affected the data reported?

Yes* No *If your answer is Yes, you may explain in Section 4.m. on Page 3.

Section 3: Chemicals Used in Waste Treatment Units

a. Is this chemical used to treat waste or control pollution?

Yes No* *If your answer is No, please skip ahead to Section 4.

b. Please enter the amount of the chemical (in pounds) used to treat waste or control pollution.

Pounds

Section 3: Chemicals Used in Waste Treatment Units (continued)



Toxics Use Report - Form S

Chemical Use Facility-Wide and by Production Units

2019
Reporting Year
Web Coating PST Company
Facility Name
996492
DEP Facility ID Number
Methyl Ethyl Ketone
Chemical Name

c. Did the use of this chemical for waste treatment or pollution control increase or decrease by 10 percent or more compared with the previous reporting year?

c.1. Yes* No
c.2. Yes No
*If your answer is Yes, you may explain in Section 4.m. on Page 3.
Are there more chemicals to report? (Use ONLY if ALL chemicals are used to treat waste or control pollution.)

Section 4: Toxics Use by Production Unit

003

a. Production Unit #

Use

b. Quantity of Chemical Code:

1. ≤5,000 lbs. 2. > 5,000 ≤10,000 lbs. 3. > 10,000 lbs. ≤100,000 lbs.
 4. > 100,000 lbs. ≤500,000 lbs. 5. > 500,000 lbs.

c. Did the use of this chemical in this production unit increase or decrease by 10 percent or more compared with the previous reporting year and/or did you implement toxics use reduction?

Yes No* *If your answer is No, skip ahead to g. below.

Process code(s) where most significant changes occurred (up to three in descending order)

Type of Change (Enter "I" for Increase, "D" for Decrease)

Technique Code(s) (up to three per process code)

| Process code(s) | Type of Change | Technique Code(s) | Technique Code(s) | Technique Code(s) |
|-----------------|----------------|-------------------|-------------------|-------------------|
| d.1. _____ | 2. _____ | 3a. _____ | 3b. _____ | 3c. _____ |
| e.1. _____ | 2. _____ | 3a. _____ | 3b. _____ | 3c. _____ |
| f.1. _____ | 2. _____ | 3a. _____ | 3b. _____ | 3c. _____ |

Byproduct

g. Was byproduct generated for this chemical less than 1 percent of use in this production unit?

Yes* No *If your answer is Yes, skip ahead to m. on Page 3.

h. Did the byproduct generated for this chemical in this production unit increase or decrease by 10 percent or more compared with the previous reporting year and/or did you implement toxics use reduction?

Yes No* *If your answer is No, skip ahead to m. on Page 3.

Process code(s) where most significant changes occurred (up to three in descending order)

Type of Change
(Enter "I" for Increase, "D" for Decrease)

Technique Code(s)
(up to three per process code)

i.1. _____

2. _____

3a. _____

3b. _____

3c. _____

j.1. _____

2. _____

3a. _____

3b. _____

3c. _____

k.1. _____

2. _____

3a. _____

3b. _____

3c. _____

l. Are there more production units that use this chemical?

Yes No

m. You may add any comments or explanations regarding chemical use and/or byproduct generated in this production unit, chemical use in waste treatment (from Section 3), and non-routine occurrences at your facility (from Section 2).

Section 4: Toxics Use by Production Unit (continued)

009

a. Production Unit #

Use

b. Quantity of Chemical Code:

1. ≤5,000 lbs. 2. > 5,000 ≤10,000 lbs. 3. > 10,000 lbs. ≤100,000 lbs.
 4. > 100,000 lbs. ≤500,000 lbs. 5. > 500,000 lbs.

c. Did the use of this chemical in this production unit increase or decrease by 10 percent or more compared with the previous reporting year and/or did you implement toxics use reduction?

- Yes No* *If your answer is No, skip ahead to g. below.

| Process code(s) where most significant changes occurred (up to three in descending order) | Type of Change (Enter "I" for Increase, "D" for Decrease) | Technique Code(s) (up to three per process code) | | |
|--|--|---|-----|-----|
| FF-01 | D | 10 | 50 | |
| d.1. | 2. | 3a. | 3b. | 3c. |
| AA-03 | D | 50 | | |
| e.1. | 2. | 3a. | 3b. | 3c. |
| f.1. | 2. | 3a. | 3b. | 3c. |

Byproduct

g. Was byproduct generated for this chemical less than 1 percent of use in this production unit?

- Yes* No *If your answer is Yes, skip ahead to m. on Page 3.

h. Did the byproduct generated for this chemical in this production unit increase or decrease by 10 percent or more compared with the previous reporting year and/or did you implement toxics use reduction?

- Yes No* *If your answer is No, skip ahead to m. on Page 3.

| Process code(s) where most significant changes occurred (up to three in descending order) | Type of Change (Enter "I" for Increase, "D" for Decrease) | Technique Code(s) (up to three per process code) | | |
|--|--|---|-----|-----|
| FF-01 | D | 10 | 50 | |
| i.1. | 2. | 3a. | 3b. | 3c. |
| AA-03 | D | 50 | | |
| j.1. | 2. | 3a. | 3b. | 3c. |
| k.1. | 2. | 3a. | 3b. | 3c. |

l. Are there more production units that use this chemical? Yes No

m. You may add any comments or explanations regarding chemical use and/or byproduct generated in this production unit, chemical use in waste treatment (from Section 3), and non-routine occurrences at your facility (from Section 2).

We substituted a less toxic terpene for MEK in cleanup operations. We also made

adjustments to operating equipment resulting in less equipment requiring adhesive removal

Solution for Problem #4:

Reporting Year: **2019**

Facility Name: **Web Coating PST Company**

DEP Facility ID Number: **996492**

Chemical Name: **Methyl Ethyl Ketone (MEK)**

Section 1: Facility wide use of Listed Chemical

1a. **78-93-3**

1b. **Methyl Ethyl Ketone (MEK)**

1e. **184,909 lbs** **Otherwise Used**

Total use = Amount used in P.U. #3 (123,642 lbs) + Amount used in P.U. #9 (61,267 lbs)
= 184,909 lbs

1f. **184,909 lbs** **Generated as Byproduct**

(Assumes all solvent evaporates from product)

Section 2: Materials Balance

2f. **No**

Section 3: Chemicals Used in Waste Treatment Units

3a. **No**

Section 4: Toxics Use by Production Unit – Production Unit #3

4a. **Production Unit #3**

4b. **4. > 100,000 lbs. ≤ 500,000 lbs.**

4c. **No.**

Formula: If:

$$\text{(previous year's use)} * 0.9 < \text{(reporting year's use)} < \text{(previous year's use)} * 1.1$$

Then: the use of the chemical did not change by 10%.

$$\text{2018 use (125,789 lbs)} * 1.1 = 138,368 \text{ lbs}$$

$$\text{2018 use (125,789 lbs)} * 0.9 = 113,210 \text{ lbs}$$

2019 Use = 123,642 lbs. No toxics use reduction was implemented for this production unit.

4g. **No.**

4h. **No.**

Formula: If:

$$\text{(previous year's byproduct generation)} * 0.9 < \text{(reporting year's byproduct generation)} < \text{(previous year's byproduct generation)} * 1.1$$

Then: byproduct generation of the chemical did not change by 10%.

$$\text{2018 byproduct generation (125,789 lbs)} * 1.1 = 138,368 \text{ lbs}$$

$$\text{2018 byproduct generation (125,789 lbs)} * 0.9 = 113,210 \text{ lbs}$$

2019 byproduct generation = 123,642 lbs. No toxics use reduction was implemented for this production unit.

4l. **Yes.**

Section 4: Toxics Use by Production Unit – Production Unit #9

4a. **Production Unit #9**

4b. **3. > 10,000 lbs. ≤ 100,000 lbs.**

4c. **Yes.**

Formula: If:

(previous year's use)*0.9 < (reporting year's use) < (previous year's use)*1.1

Then: the use of the chemical did not change by 10%.

2018 use (100,752 lbs) * 1.1 = 110,827 lbs

2018use (100,752 lbs) * 0.9 = 90,677 lbs

2019 Use = 61,267 lbs.

4d1. **FF-01.**

4d2. **D**

4d3a. **10**

4d3b. **50**

4e1. **AA-03**

4e2. **D**

4e3a. **50**

4g. **No.**

4h. **Yes.**

Formula: If:

(previous year's byproduct generation) * 0.9 < (reporting year's byproduct generation) < (previous year's byproduct generation) * 1.1

Then: byproduct generation of the chemical did not change by 10%.

2018 byproduct generation (100,752 lbs) * 1.1 = 110,827 lbs

2018 byproduct generation (100,752 lbs) * 0.9 = 90,677 lbs

2019 byproduct generation = 61,267 lbs.

4i1. **FF-01.**

4i2. **D**

4i3a. **10**

4i3b. **50**

4j1. **AA-03**

4j2. **D**

4j3a. **50**

4l. **No.**

4m. We substituted a less toxic terpene for MEK in clean-up operations. We also made adjustments to operating equipment resulting in less equipment requiring adhesive removal in clean-up operations.

Appendix D: Common Reporting Errors

1. The toxics use report is missing forms.

A complete toxics use report includes the following:

- ✓ Form S Cover Sheet
- ✓ Form S for each chemical
- ✓ Form R for each chemical (or Form A, if applicable)
- ✓ Fee worksheet

Incomplete TURA reporting may result in late fees, enforcement and fines. **Each facility must file one Form S cover sheet for the facility as a whole. For each chemical reported, a Form R and Form S must be completed.** For ease of review, please place the Form R on top of the Form S for each chemical reported

2. Total chemical use as reported in Sections 1 c, d, and e of the Form S is not equal to the sum of the amounts generated as byproduct (Section 1 f) and shipped in product (Section 1 g).

Section of the report that may need correcting: FORM S: Section 1: Facility-wide Use of Chemical

Generally, there is a materials balance between chemical inputs and outputs on a facility-wide basis:

$$\text{manufactured} + \text{processed} + \text{otherwise used} = \text{byproduct} + \text{shipped in product}$$

If this is not the case on all of your forms, you should have checked one of the explanations (i.e., chemical was recycled on-site) in Section 2 on the Form. Otherwise, your materials accounting for the chemical may need to be checked.

3. The amount reported as byproduct on the Form S is *less than* the quantities reported in Section 8 (Source Reduction and Recycling Activities) of the Form R.

Sections of the report that may need correcting: FORM S: Section 1, item f: Facility-Wide byproduct generated and/or FORM R: Sections 5 and 6.

Byproduct will usually be equal to, or exceed, transfers and releases, since byproduct is the total quantity of waste that is generated during the production process calculated **before** it has been treated. The only time byproduct is less than transfers and releases is when some byproduct is reported as product on the Form S.

4. The amount reported as byproduct on the Form S, is *greater than* the quantities reported in Section 8 (Source Reduction and Recycling Activities) of the Form R when there is no on-site energy recovery, recycling, or destructive treatment.

Sections of the report that may need correcting: FORM S: Sections 1 item f: Facility-Wide byproduct generated, Section 2: Materials Balance and/or FORM R: Section 7.

Byproduct is the total quantity of waste that is generated during the production process, calculated **before** it has been treated. If a treatment system destroys some or all of the byproducts, or some of the byproducts are recycled, the reported byproducts will be greater than releases and transfers off-site. If there is no destructive treatment (including energy recovery), on-site recycling, or byproduct reported as product, then total byproduct on the Form S will be equal to Section 8 of the Form R.

5. The production ratio in Section 1.i of the Form S is reported as <0.2 or >10.

This is the same production ratio that is reported on the Form R. It is the current year production amount in those production units in which the chemical is used, divided by the previous year's production level. *Note: The production ratio should never be a negative number. If the production level decreased from the previous year, the production ratio should be a decimal number less than one (e.g., 0.80 means that the production level in the reporting year was 80% of the production in the previous year). If the production level has increased from the previous year, the production ratio should be a decimal number greater than one (e.g., 1.2 means that the production level in the reporting year was 20% greater than the production level in the previous year).*

6. A facility does not meet the requirements for filing a State Only Form A

A facility may only use a Form A, IF the total of the amount treated, recycled, disposed, released, used for energy recovery onsite and offsite IS LESS THAN 500 pounds. These volumes correspond to the sum of amounts reportable for data elements in Section 8, the summary of the report: Section 8.1 (quantity released), Section 8.2 (quantity used for energy recovery onsite), Section 8.3 (quantity used for energy recovery off-site), Section 8.4 (quantity recycled onsite), Section 8.5 (quantity recycled off-site), section 8.6 (quantity treated onsite), and Section 8.7 (quantity treated off-site). If more than a total of 500 pounds is reported in Section 8, the facility must report a State Only Form R. If a facility does not meet these requirements and uses a Form A, then Mass DEP may follow up with an enforcement action.

Appendix E: Questions and Answers

GENERAL REPORTING QUESTIONS

1. What happens if the facility reported last year but is exempt this year?

If the facility does not have to report this year but reported in a previous year, MassDEP recommends notification to MassDEP in writing with an explanation as to why they do not have to report. This will help MassDEP distinguish facilities that are exempt from those that are out of compliance. The Form S Cover Sheet has a section that may be completed if the facility is newly exempt from reporting. A letter may also be sent to MassDEP.

2. When should a plan summary be submitted?

Facilities must prepare or update their Plans in even-numbered calendar years only. A plan summary, resource conservation summary, or EMS progress report must be submitted to MassDEP by July 1st of the even-numbered year.

3. How does a facility file a trade secret claim?

To make trade secret claim in the facility's toxics use report, please call MassDEP's TURA Program at 617-292-5711 to request the "Trade Secret Special Instructions".

WASTE TREATMENT CHEMICALS

4. If the whole facility is claimed as a production unit, can the waste treatment system be included as part of the production unit?

No. Waste treatment units are not considered manufacturing processes and therefore cannot be included in production units. Companies should track chemicals used in waste treatment units separately from those used in production units. Companies should report chemical use associated with waste treatment operations in Section 3 of the Form S, Chemicals Used in Waste Treatment Units.

5. What if the waste treatment unit is “hard-piped” or “integral” to the production process, can it then be considered as part of the production unit?

No. Waste treatment units are not considered production processes even if they are “integral” to the manufacturing process. Chemicals used in them are reported separately from production units.

6. How can you correct reporting if a previously reported waste treatment unit was part of the production unit?

Consider all waste streams previously treated by the waste treatment unit as byproducts from production units in the facility. These byproducts should be allocated back to the production unit where they were generated. Chemicals used to perform the waste treatment operations (for

example, acids and bases used for pH adjustment) can be reported separately in Section 3 of the Form S.

7. When spent acid process bath is dumped, it is used in the facility's waste treatment, as is, without further treatment. Can the byproduct be reported as product?

No. Byproduct as product that is used on site must be used in a manufacturing process to be considered byproduct as product. Amounts of spent acid and base baths that are used to adjust pH in waste treatment operations can be used to reduce facility-wide use of the reportable chemicals. They are still considered byproducts when they leave the production unit.

TUR PLANNER CERTIFICATION

8. How can one apply for certification or recertification as a TUR Planner?

Please call 617-292-5982 for a "Planner Certification Application" or "Planner Recertification Application," depending upon your situation. Please refer to MassDEP's website at: <https://www.mass.gov/how-to/tu-01-03-general-practice-tur-planner-certification-or-recertification>.

9. If a planner has questions concerning applying for certification or recertification, how can they get assistance?

Yes. Please call the MassDEP Planner Certification Program at 617-292-5982.

10. Can a planner receive credit for applicable courses taken outside the TURI and OTA curriculum?

Yes, as long as the courses fit the regulatory requirements found in 310 CMR 50.58. Courses offered by either OTA or TURI are usually pre-approved by MassDEP for use by TUR Planners seeking recertification credit. However, Planners do not receive credit by simply attending the pre-approved course; they must apply to MassDEP using the TUR Planner Continuing Education Credit Pre-approval Form to receive the credit.

Any organization wishing to offer courses pre-approved for credit for TUR Planners may contact the MassDEP Planner Program at 617-292-5982 for more information. MassDEP normally requests some tangible information (e.g., a syllabus, course description and length of time) prior to pre-approving a course for Planner credit. Once again, each Planner attending a pre-approved course and seminar must apply to MassDEP in order to receive the credit.

11. How can a TUR Planner find out what courses TURI is offering or planning to offer that are suitable for credit toward recertification?

Information on courses offered by TURI is available on the TURI web site at www.turi.org.

12. If a TUR Planner takes a course approved by MassDEP for TUR Planner credits, does he/she still need to apply to MassDEP for credit?

Yes. MassDEP may give a course instructor permission to state that MassDEP has approved his or her course for use by TUR Planners for recertification credit. However, in order to receive the credit, a Planner must apply to MassDEP. A Planner may wait until all the required credits are obtained or may use the TUR Planner Continuing Education Credit Pre-approval Form to receive credit immediately.

13. Is there a rollover of recertification credits into the next 2-year period allowed for those TUR Planners who have accumulated more than the required credits in any given certification and recertification period?

Generally no, since allowing a rollover of extra credits into the next recertification period would defeat the basic purpose of recertification, which is to keep TUR Planners up-to-date on current TUR planning techniques. However, exceptions may be made in certain situations. For example, an exception could be made for obtaining extra credits by taking a relevant TUR course during the end of a TUR Planner's certification or recertification period. In this case, some of the surplus credits could possibly be used toward the next recertification period.

14. What are the TUR Planner requirements for certifying Resource Conservation (RC) Plans and Environmental Management Systems (EMS)?

The requirements can be found on MassDEP's web page:

<https://www.mass.gov/doc/instructions-general-practice-tur-planner-certificationrecertification>

15. Do TUR Planners need additional credits to sign RC Plans and EMS plans?

No. Any RC and EMS credits obtained count toward the total number of credits required for recertification.

16. When are TUR Planner examinations held?

There are no set dates for TUR Planner examinations. MassDEP generally offers the examination once each year during late fall (in November or December), after TURI's planner course has been completed. TURI announces the pending examination in its planner classes.

Appendix F: Chemicals that Have Been Delisted Under TURA

The following chemicals have been delisted from TURA (but in certain cases are reportable under EPCRA):

| Reporting Year/Chemical Delisted | Reason/Note | Year Delisted |
|--|---|---------------|
| Barium Sulfate | EPCRA delisting and not CERCLA reportable | 1994 |
| All copper phthalocyanine compounds that are substituted with only hydrogen and/or chlorine and/or bromine (delisted from the copper compounds category) | EPCRA delisting and not CERCLA reportable | 1994 |
| High molecular weight glycol ethers | EPCRA delisting and not CERCLA reportable | 1994 |
| Certain Metal Alloys (refer to Appendix B, Guidance for TURA Reporting and Planning for Certain Metals and Metal Alloys) | TURA Administrative Council delisting | 1995 |
| Chromium (III) Oxide from chromium compounds category | TURA Administrative Council delisting | 1995 |
| Ammonium Sulfate Solution (CAS#7783-20-2) | EPCRA delisting and not CERCLA reportable | 1995 |
| Ammonium Nitrate Solution (CAS#6484-52-2) | EPCRA delisting and not CERCLA reportable | 1995 |
| Hydroquinone (except for the manufacture of the chemical) | TURA Administrative Council delisting | 1996 |
| Acetic Acid at concentrations of 12% or less | TURA Administrative Council delisting | 1996 |

| Reporting Year/Chemical Delisted | Reason/Note | Year Delisted |
|---|---|----------------------|
| Di-(2-ethylhexyl)adipate (DEHA) (CAS#103-23-1) | EPCRA delisting and not CERCLA reportable | 1996 |
| Zinc Oxide from zinc compounds category | TURA Administrative Council delisting | 1997 |
| Radionuclides | TURA Administrative Council delisting | 1997 |
| 2-bromo-2-nitropropane (Bronopol) (CAS#52-51-7) | EPCRA delisting and not CERCLA reportable | 1997 |
| 2, 6 dimethylphenol (CAS# 576-26-1) | EPCRA delisting and not CERCLA reportable | 1997 |
| Carbamate waste category | CERCLA delisting and not EPCRA reportable | 1997 |
| Silver-Copper Alloy | TURA Administrative Council delisting | 1998 |
| Pure Copper and Pure Silver | TURA Administrative Council delisting | 1999 |
| Caprolactum (CAS# 105602) | CERCLA delisting and not EPCRA reportable | 1999 |
| Zinc Stearate from zinc compounds category | TURA Administrative Council delisting | 2000 |
| Adipic Acid | TURA Administrative Council delisting | 2010 |
| Ammonium Bicarbonate | TURA Administrative Council delisting | 2010 |
| Ammonium Chloride | TURA Administrative Council delisting | 2010 |
| Ammonium Sulfamate | TURA Administrative Council delisting | 2010 |
| Amyl Acetate | TURA Administrative Council delisting | 2010 |

| Reporting Year/Chemical Delisted | Reason/Note | Year Delisted |
|---|---------------------------------------|----------------------|
| Fumaric Acid | TURA Administrative Council delisting | 2010 |
| Maleic Acid | TURA Administrative Council delisting | 2010 |

Appendix G: Integral Recycling Guidance under TURA

Introduction

The Toxics Use Reduction Act (TURA) identifies six (6) techniques that constitute toxics use reduction. The sixth technique is “recycling, reuse or extended use of toxics by using equipment or methods which become an integral part of the production unit of concern, including but not limited to filtration and other closed loop methods.” TURA also states, in part, that “toxics use reduction shall not include... off-site or out-of-production unit waste recycling.” This guidance provides detail on what types of activities are considered “integral recycling” under TURA.

Should the use of this integral recycling guidance at the facility result in significant reductions in the facility-wide use or byproduct amounts, please contact the TURA Program at tura.program@mass.gov. Significant changes in reporting can skew TURA trend data analysis and notification to MassDEP will allow the Department to modify amounts to prevent over counting of actual reductions.

Definitions: Activities Considered “Integral Recycling” Under This Guidance

- ❑ In order for an activity to qualify as “integral recycling” the material must be recycled or reused, not treated at the end of the process. The TURA statutory language refers to “recycling, reuse or extended use of toxics...” and the statutory definition of “toxics use reduction” specifically excludes anything that is, or that promotes, “end-of-pipe treatment.”

If the recycling equipment and piping are permanently connected to a single production unit, or if the recycling equipment is connected via detachable* hoses to a single production unit, the operation is integral.

- ❑ Detachable*, portable recycling equipment directly connected to the production unit while the recycling equipment is in operation is considered integral. There must be a sealed connection while the unit is in operation.
- ❑ If a manufacturing process includes a directly connected holding tank as part of its production unit, and the recycling unit is directly connected to the tank, this qualifies as integral recycling under this policy.
- ✚ Recycling, reuse, or extended use of toxics by using equipment or methods which become an integral part of the production unit of concern, including but not limited to filtration and other closed loop methods, are considered to be ‘integral’. TURA’s definition of integral recycling may not meet the definition of RCRA’s “totally enclosed”, but it is in compliance with MassDEP’s hazardous waste regulations (310 CMR 30.00). If the facility has a RCRA integral treatment, then the only amount that would count under TURA is the amount of byproduct that comes out of that treatment.

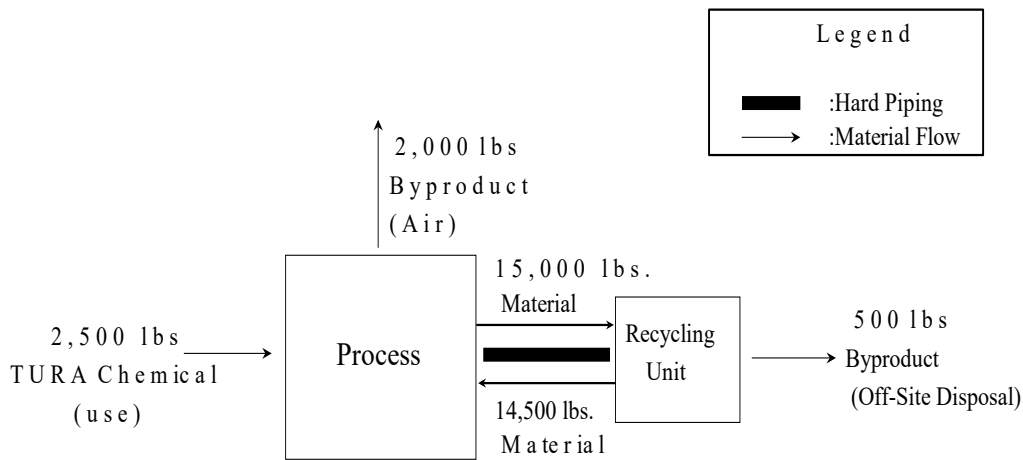
* Whenever detachable pipes are used in conjunction with a recycling unit, a written spill prevention plan must be prepared and kept on file to minimize worker exposure and to prevent

releases when connecting, disconnecting, and operating the recycling unit. This spill prevention plan minimizes any increased risk of worker exposures that may arise from this expanded definition of integral recycling under TURA. TURA filers who do not wish to prepare and keep on file this spill contingency plan should consider the recycling unit (connected via detachable hoses) non-integral under TURA and report accordingly.

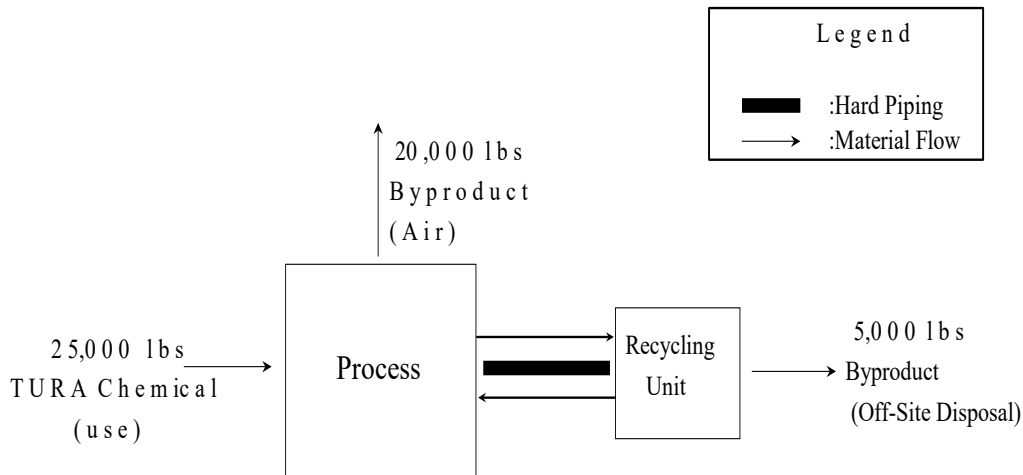
INTEGRAL RECYCLING EXAMPLES

✓Example: 1

A. This diagram illustrates the accounting of chemicals used and quantities of waste generated each time (batch) the reportable chemical is input to this process. (For this example, the chemical use occurs ten times each year. This example is further discussed below under “description of example process”.)



B. This diagram shows quantities that are reported annually for a chemical that is integrally recycled in this process.



Description of example process: In diagram A, ten times per year 2,500 lbs. of virgin chemical is fed into the process to supplement the 14,500 lbs. of integrally recycled chemical that is reintroduced to the process on the same schedule. During the process that uses each of the ten batches of chemicals 2,000 lbs. of byproduct is released into the air. Once each batch of chemical is spent, the spent chemical is pumped through the integrally connected recycling unit that produces 500 lbs. of byproduct as off-site disposal per batch.

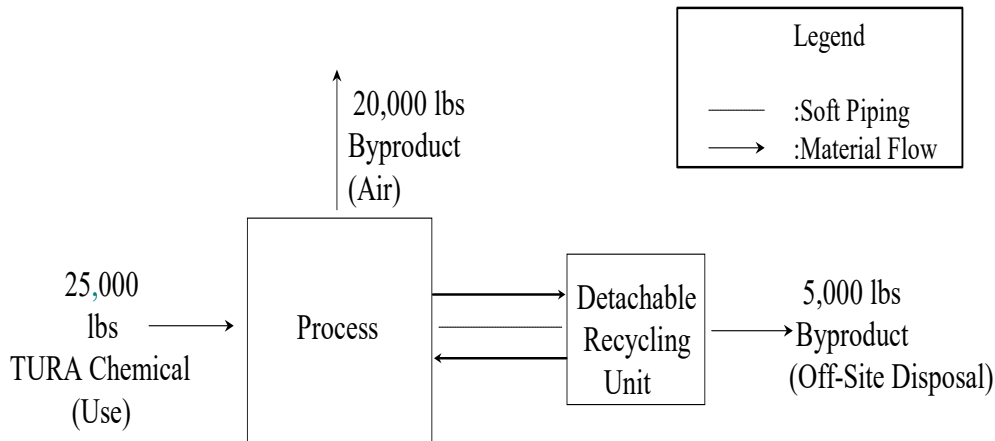
The quantities in diagram B represent the annual amounts of byproduct produced and material processed. Because the unit is integrally connected, the chemical recycled is not reported as an input to the process, and spent chemical piped to the recycling unit is not considered byproduct.

For this example of Integral Recycling, the Form S, Section 1 would be completed as follows:

- | | | | |
|------------------------------|---------------|----------------------------|---------------|
| c. Manufactured: | 0 | d. Processed: | 0 |
| e. Otherwise Used: | 25,000 | f. Generated as Byproduct: | 25,000 |
| g. Shipped in or as Product: | 0 | | |

✓Example: 2

To qualify as integral recycling, the detachable recycling unit must be connected to the process unit while the recycling unit is in operation via detachable couplings. The couplings must be appropriate for this use and perform similarly as hard piping. A written spill prevention plan must be developed to minimize risk of worker exposure and to prevent spills or leaks when connecting, disconnecting, or operating the recycling equipment.



Description of example process: The quantities in the diagram show the annual amounts of byproduct produced and material processed. Because the recycling unit is integrally connected, the chemical recycled is **not** reported as an input to the process, and spent chemical piped to the recycling unit is **not** considered byproduct.

For this example of Integral Recycling, the Form S Section 1 would be filled out as follows:

c. Manufactured: 0

d. Processed: 0

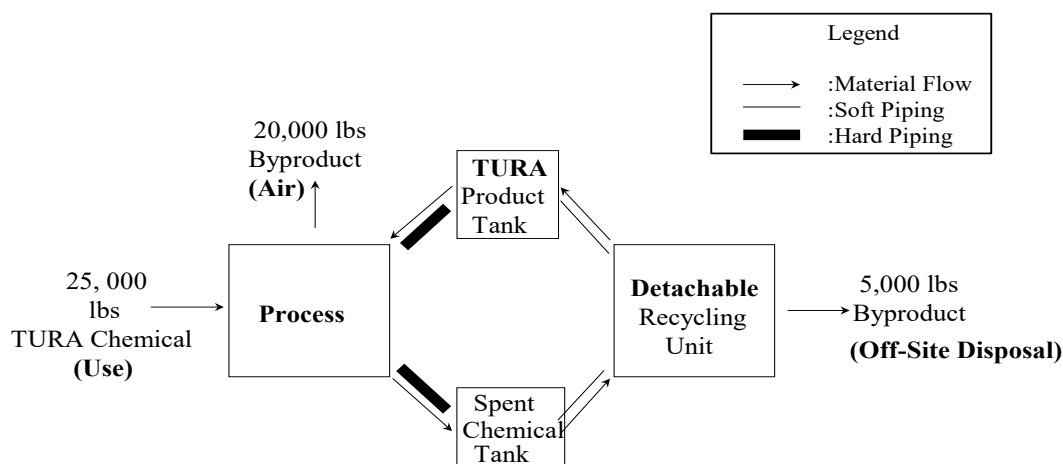
e. Otherwise Used: **25,000**

f. Generated as Byproduct: **25,000**

g. Shipped in or as Product: 0

✓Example: 3

A recycling process used to store spent chemicals that are subsequently recycled using either a hard-piped or detachable recycling unit, qualifies as “integral.” The recycling unit must be connected to the tank when the recycling unit is in operation. A written spill prevention plan must be developed to minimize risk of worker exposure and prevent spills or leaks when connecting and disconnecting or operating the recycling equipment.



Description of sample process: The quantities in the diagram show the yearly amounts of byproduct produced and material processed. Because the unit is integrally connected, the recycled chemical is not reported as an input to the process, and spent chemical piped to the recycling unit is not considered byproduct.

For this example of Integral Recycling, the Form S, Section 1 would be filled out as follows:

- c. Manufactured: 0
- d. Processed: 0
- e. Otherwise Used: **25,000**
- f. Generated as Byproduct: **25,000**
- g. Shipped in or as Product: 0

NON-INTEGRAL RECYCLING (ON-SITE)

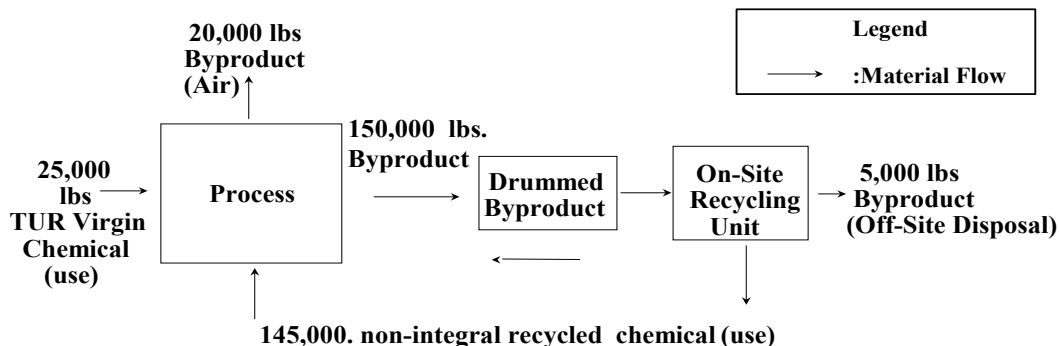
Activities where spent material is removed from the process and transferred into tanks, barrels, or other containers for disposal or recycling at a different location in the facility are **not** considered integral under this policy. To be considered integral, spent material from the production process must be pumped directly into the recycling unit or into a directly connected tank, and then to a directly connected recycling unit.

✓Example: 4

Non-integral, On-Site Recycling Reporting: Many companies have non-integral recycling operations on-site. Their processes include drumming and transporting the material to be recycled at a different location in the facility at some point during the operation. These recycling processes are not considered “integral recycling”; however TURA and this guidance recognize on-site, non-integral recycling as follows: Companies practicing on-site, non-integral recycling are required to count the recycled chemical as byproduct each time the recycled chemical exits the production unit. Additionally, each time the recycled material

is re-introduced as an input to the production unit, it should be added to chemical use quantities at the production unit level, but not to the facility-wide use levels. Therefore, any type of on-site recycling is not counted towards facility-wide use of the chemical, and will result in a reduction in the facility-wide total usage number.

Non-Integral Recycling Example (on-site)
Quantities based on yearly totals



Description of Sample Process: Each year, 25,000 lbs. of virgin chemical plus 145,000 lbs. of recycled chemical are added to the process (inputs). Each year, 20,000 lbs. of byproduct are released to the air and 150,000 lbs. of spent chemical are drummed and brought to the on-site recycling unit. The quantities in the diagram show the annual amount of byproduct produced and materials processed. Because this is on-site non-integral recycling, the 145,000 lbs. of recycled chemical are not counted towards facility-wide use, but are counted toward chemical use at the production unit level. (The total byproduct from the production unit is the 150,000 lbs. of chemical drummed for recycling and the 20,000 lbs. of air emissions. The 5,000 lbs. of off-site disposal is already included in the byproduct number.)

For this example of a company performing Non-Integral On-Site Recycling, the Form S, Section 1, would be filled out as follows:

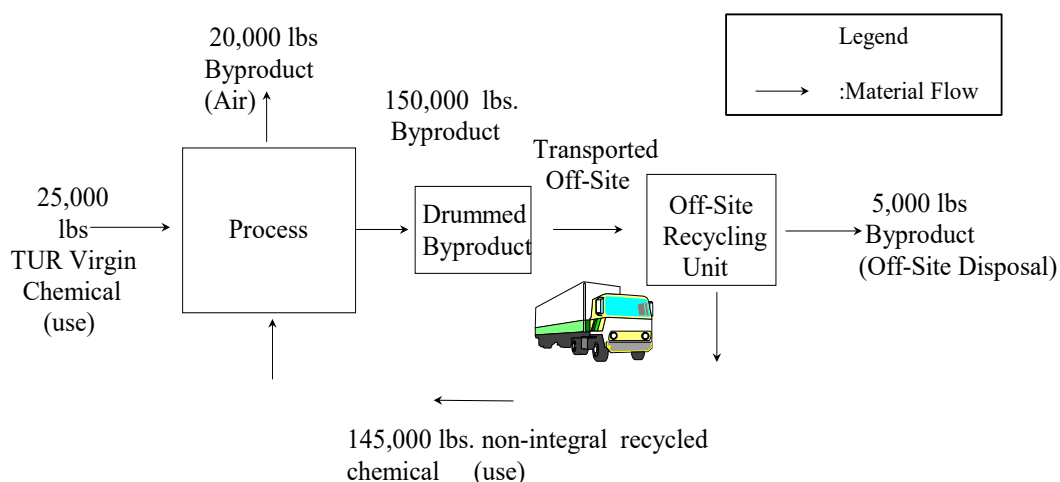
- c. Manufactured: 0
- d. Processed: 0
- e. Otherwise Used: **25,000**
- f. Generated as Byproduct: **170,000**
- g. Shipped in or as Product: 0

Comparing Example 4 with the non-integral off-site recycling explained in Example 5 below demonstrates how facility-wide input numbers are minimized with non-integral, **on-site** recycling versus non-integral off-site recycling. It should be noted on the Form S, Section 2, that on-site recycling has affected the materials balance for the chemicals in question.

✓Example: 5

Non-Integral Off-Site Recycling Reporting: Activities where materials are sent off-site for recycling are **not** considered integral under this guidance. Materials recycled off-site and re-introduced into the process, must be counted as byproduct and use both at the facility-wide and production unit levels. This can add significantly to the amount of chemical brought on-site and reported as facility-wide chemical use.

Non-Integral Recycling Example (off-site)
Quantities based on yearly totals reported



Description of Example Process: 25,000 lbs of virgin solvent plus 145,000 lbs of recycled solvent are added to the process (inputs) annually. Each year, 20,000 lbs of byproduct are released to the air and 150,000 lbs spent chemical is drummed and shipped off-site to a company which recycles spent solvent. This off-site recycling unit generates 5,000 lbs of waste. The quantities in the diagram show the annual amounts of byproduct produced and material processed. Because this facility uses off-site non-integral recycling, the recycled chemical, as well as the virgin chemical, must be counted as inputs to the process. Additionally, the spent chemical, as well as the byproduct emitted to the air, must be counted as byproduct. The 5,000 lbs of waste is neither generated nor reported by this facility.

For this example of a company performing Non-Integral Off-Site Recycling, the Form S, Section 1, would be filled out as follows:

- c. Manufactured: 0
- d. Processed: 0
- e. Otherwise Used: 170,000
- f. Generated as Byproduct: 170,000
- g. Shipped in or as Product: 0

Appendix H: Guidance For Using TURA Production Process Codes

This appendix explains how to use the new standardized codes to describe the production processes included in your production unit(s).

Under TURA, the "production unit" [defined as the process(es) used to produce a product] is the basic unit for reporting and planning. In its regulations, MassDEP chose to give firms flexibility over how they designate their production units. The rationale was that firms are better suited to determine meaningful product and process combinations than are the regulators.

In TURA reporting, firms list their production units (as they chose to define them) in the Form S Cover Sheet -- identifying the products using one or more six-digit NAICS codes and describing the processes in their own words. MassDEP amended the TURA regulations (310 CMR 50.30) to incorporate reporting on production processes using generic codes.

This Appendix describes how and why the codes were developed and then explains how to use them to report information on the Form S Cover Sheet. (See "TUR Production Process Codes by Process Type" below for the annotated list of the codes.)

Do the codes require that a firm make changes in the way it defined its production unit?

No. The coding system is intended to maintain the traditional flexibility firms have been given in grouping products and processes into production units. No change in how firms define their production units is required. The codes are generic enough that most firms should only need a few codes to describe their processes.

Why were these codes developed?

The standardized process codes were developed, in large part, because of differences in the way similar processes were described by different companies. MassDEP wants to retain the flexibility given to firms in designating production units. We also need to identify, however, the similarities and differences in processes as part of potentially developing user segment regulations.

The coding system is intended to be used to group the 800+ processes reported each year into broad categories based on similarities and differences in such things as: 1) processes, 2) chemical use, 3) byproduct production, and 4) opportunities for TUR. Alpha-numeric codes have been assigned to each generic category.

✓ Example 1: Off-Site Non-Integral Recycling

Each year, a number of firms report deionization of water as a production unit, although the way they describe this process varies. Some refer to it as "D/I Unit," others report only the "regeneration of resins for deionization," etc.

These firms represent a variety of industries, including paper making, pharmaceuticals, electroplating, and co-generation of steam. With the coding system, these firms would uniformly report HH-01 for deionizing water. Once this code is entered into the computer system, MassDEP can run a report, for example, to determine what TUR techniques have been adopted. Any promising developments in one industry can be researched for potential applicability in other industries.

MassDEP has, in fact, seen examples where technology transfers look promising. One TURA filer, primarily a chemical manufacturer, uses electroplated copper powders or flakes as a component in its products. That firm has developed an electroplating process that eliminates the need to use cyanide compounds. Although the process is patented, its development in one industry suggests the potential for technology transfer to traditional electroplating firms.

How To Use the Production Process Codes

Shown below is an excerpt from the **Form S Cover Sheet** showing the top half of Section 4, and calls for identifying the production unit by number, describing the processes involved, describing the product etc.

Section 4: Facility-Wide Listing of Production Units

A PRODUCTION UNIT is best thought of as the combination of the process (or activities) used to produce a product or service and the product or service. In this section, please identify the PRODUCTION UNITS at the facility, then use the production unit number to report on chemical use in the Form S.

If there has been a substantial change in a PRODUCTION UNIT from the previous reporting year, the PRODUCTION UNIT must be given a new, unique number.

| | | | | | | | | |
|--|---------------------------------|--------------------------------|-----------------------------------|---------------------------------|------------------------------|---------------------------------|---------------------------------|---------------------------------|
| a. Production Unit # | b. Describe the Process: | | | | | | | |
| is this production unit IN USE for the reporting year of this submittal? | _____ | | | | | | | |
| <input type="checkbox"/> yes <input type="checkbox"/> no | _____ | | | | | | | |
| | c. Describe the Product: | | | | | | | |
| | _____ | | | | | | | |
| | _____ | | | | | | | |
| Enter up to four (4) six-digit NAICS Codes that best describe the Product from this Production Unit: | | | | | | | | |
| d. NAICS Code | e. NAICS Code | f. NAICS Code | g. NAICS Code | | | | | |
| _____ | _____ | _____ | _____ | | | | | |
| h. Check the appropriate description for the unit of product: | | | | | | | | |
| <input type="checkbox"/> area | <input type="checkbox"/> dollar | <input type="checkbox"/> hours | <input type="checkbox"/> kilowatt | <input type="checkbox"/> length | <input type="checkbox"/> N/A | <input type="checkbox"/> number | <input type="checkbox"/> volume | <input type="checkbox"/> weight |

Where the form calls for information concerning the process, a firm should describe any process step that involves a TURA-reported chemical as an input, output or throughput.

A firm need NOT describe a process step that does not involve a TURA chemical. For example, a juice manufacturer would not have to describe mixing as a process step unless a TURA chemical being reported this year was involved. Another manufacturer that mixed food grade acetic acid to produce salad dressing would report the mixing step.

MassDEP does not expect extremely detailed descriptions of process steps and in the past most firms have described their processes in sufficient detail. However, more specific descriptions will help MassDEP identify similarities and differences in the production processes of firms.

✓ Example 2: Off-Site Non-Integral Recycling

Instead of describing process as "household appliance manufacturing," it would be more helpful if the firm reported "spray coating and assembly of household appliances."

After describing the process, a firm describes the product and enters the six-digit NAICS code(s) that best describes that product. Then the unit of product is described in narrative fashion. (See the reporting instructions for more detailed information on completing the first part of Section 4 of the Form S Cover Sheet.)

Using the standardized process codes

Shown below is that part of Section 4 that calls for firms to enter the appropriate standardized process codes.

Production Process Step Information For This Production Unit

i. Enter the production process codes to identify the process steps that involve TURA-reportable chemicals as an input, output or throughput. (See the reporting guidance document for the list of production process codes and instructions on when a given code needs to be listed.)

| | | | |
|---------------------------|---------------------------|---------------------------|---------------------------|
| 1. _____ Process Code | 2. _____ Process Code | 3. _____ Process Code | 4. _____ Process Code |
| 5. _____ Process Code | 6. _____ Process Code | 7. _____ Process Code | 8. _____ Process Code |
| 9. _____ Process Code | 10. _____ Process Code | 11. _____ Process Code | 12. _____ Process Code |
| 13. _____ Process Code | 14. _____ Process Code | 15. _____ Process Code | 16. _____ Process Code |
| 17. _____ Process Code | 18. _____ Process Code | 19. _____ Process Code | 20. _____ Process Code |
| 21. _____ Process Code | 22. _____ Process Code | 23. _____ Process Code | 24. _____ Process Code |

To complete this part of the cover sheet, firms need to determine which production process code(s) best describe their activities. Note that the production process codes (which are listed in Appendix H herein) have been divided into three groups.

Note: There are some firms that may have to review the codes in all the groups. For example, this might occur with a textile manufacturer that not only dyes fabric but also formulates the dye using a chemical reaction.

Note: The examples and cross - references provided by MassDEP are based upon the agency's best understanding of production processes as described in TURA reports submitted in previous years.

With the first two groups, a distinction has been drawn between production processes generally used to provide services or make (or process) objects (Group 1) and those processes typically associated with the manufacture of chemicals (Group 2).

Group 1 contains processes that typically are used by firms that primarily make or process objects and goods (or provide services).

Group 2 is designed primarily for use by firms that manufacture or process chemicals. (Mainly firms in SIC code 28, 29, 30, some firms in 33 who recover metals, and chemical distributors.)

Group 3 lists miscellaneous processes that might be used by any firm, regardless of whether services are provided, goods are made, or chemicals produced.

DETERMINING WHICH PROCESS GROUP LIST TO USE

If the firm primarily makes or processes objects (or provides services), look first at the codes in Groups 1 and 3. If there are codes on these lists that adequately describe the processes, then there is no need to evaluate or report any of the chemical process codes in Group 2.⁹ Similarly, a firm that primarily manufactures or processes chemicals should first look at Groups 2 and 3 for applicable codes.

If the firm makes and processes objects (or provides services) and there is no code in Group 1 or Group 3 that adequately describes the process, then check the Group 2 codes. There may be a generic chemical process code that can be used. Any questions, please call MassDEP at (617) 292-5711.

For many firms, using the process code lists should be straightforward. However, MassDEP does recognize that questions and issues of interpretation of the codes may arise. To assist TURA reporters, MassDEP has included examples or other comments in the attached list of codes.

The examples and cross-references are intended ONLY as a guide; each filer is encouraged to use their own best judgment concerning which codes to use. There are, however, some general principles for using the production process codes.

- 1. Each generic process code refers to the specific steps (or unit operations) normally associated with that process.**

⁹Many process steps in **Group 1** are themselves chemical reactions. For example, electroplating is an oxidation/reduction reaction. An electroplating firm, however, would enter one of the codes for electroplating (AA-12 or AA-13, for example). The firm would NOT enter the **Group 2** code (EE-07) for oxidation/reduction reactions.

✓ Example: 3

A textile manufacturer reports, "acid aging," not as a bleaching process but as a step by which dyes are chemically activated. That manufacturer would use the code AA-22 Pigmentation and Dyeing for "acid aging" and all other steps normally associated with dyeing.

2. If a number of process steps can be categorized by one code, that code should be entered ONLY once for a given production unit.

✓ Example: 4

A tool manufacturer cuts, drills, and turns metal to produce hand tools. Generally all those processes can be classed as BB-05 Removal by Mechanical Means (Gross Mass Removal). The code BB-05 would be entered once for all those operations if they all are included in a given production unit. (If the firm had a second production unit with the same three processes, BB-05 would be reported for that production unit as well.)

3. Use all the codes that apply.

✓ Example: 5

Electroplating as a generic process includes a product-cleaning step. The appropriate code for electroplating should be reported, as well as the appropriate product cleaning code.

4. Using the "not otherwise specified" codes.

The production processes are generally placed in subgroups, such as the "Product Molding and Forming" subgroup that includes CC-01 (Casting and Molding), CC-02 (Extrusion and Drawing) CC-03 (Forging), etc.

In some groups, the last code contains the abbreviation N.O.S. for "not otherwise specified." This code should be used for processes that cannot be categorized into one of the codes above it in the subgroup.

What to do if a process is not adequately described by a listed code?

After looking at Group 1 and 3 codes, a firm that makes or processes objects should next look at the Group 2 chemical reaction codes. If one of those codes applies, use it. If no code truly seems to apply, a firm should use its best judgment to determine which coded process is "most like" the activity being reported.

✓ Example: 6

In the plastics industry there is a relatively new process for forming products known as "pultrusion." With this process, heated plastic is pulled through a die that gives it a specific shape. Assume no existing code is applicable.

However, the annotations in **Group 1** list indicate that CC-02: Extrusion and Drawing are processes that give a specific shape to a product by forcing it through a die. "Pultrusion" could be considered "most like" extrusion because a die is used to give shape to a product, even though the plastic is pulled, not pushed.

✓ Example: 7

A food manufacturer uses a TURA-reportable chemical to "fumigate" its facility. Assume that there is no code that covers this process. However, there are two processes that are similar: FF-04: Equipment Cleaning (Solvent-Based) (includes sanitizing) and HH-02 Process Water Treatment – Biocides and Disinfection (which includes chlorination).

This firm would have to use its best judgment as to which code "fumigation" is most like. If the fumigant used is a solvent, the equipment cleaning code could be viewed as the most applicable. As this example illustrates, there is not necessarily any one "right" answer for which process code is most like "fumigation."

Reporting on the chemicals associated with a production unit

Each production unit may be associated with one or more chemicals. In the last part of section 4, firms list the particular chemical(s) that are associated with the given production unit. There is a space for the chemical name and the chemical abstract service (CAS) number. (If there is no CAS number, leave that line blank.) The form then asks whether the chemical listed is associated with all the process steps coded above. If so, check "YES" and no process codes need to be entered for the chemical. If the chemical is associated with some but not all of the processes, the appropriate process codes should be listed.

To illustrate Section 4 reporting, consider a firm that makes jewelry which reports two chemicals: trichloroethane (used to clean jewelry) and ammonia (used in etching).

The cleaning step would be BB-01: Product Cleaning - Solvent-Based, and the etching process would be BB-04: Removal by Chemical Means. This firm would report as shown below.

✓ Example 8: Production Units

01

a. Production Unit #

Is this production unit IN USE for the reporting year of this submittal?

yes no

b. Describe the Process:

Cleaning and etching and jewelry

c. Describe the Product:

Jewelry

Enter up to four (4) six-digit NAICS Codes that best describe the Product from this Production Unit:

339914

d. NAICS Code

e. NAICS Code

f. NAICS Code

g. NAICS Code

h. Check the appropriate description for the unit of product:

area dollar hours kilowatt length N/A number volume weight

✓ Example 8: Production Units (Con't)

Production Process Step Information For This Production Unit

i. Enter the production process codes to identify the process steps that involve TURA-reportable chemicals as an input, output or throughput. (See the reporting guidance document for the list of production process codes and instructions on when a given code needs to be listed.)

| | | | |
|---------------------------------|---------------------------------|---------------------------|---------------------------|
| 1. <u>BB-01</u> Process Code | 2. <u>BB-04</u> Process Code | 3. _____ Process Code | 4. _____ Process Code |
| 5. _____ Process Code | 6. _____ Process Code | 7. _____ Process Code | 8. _____ Process Code |
| 9. _____ Process Code | 10. _____ Process Code | 11. _____ Process Code | 12. _____ Process Code |
| 13. _____ Process Code | 14. _____ Process Code | 15. _____ Process Code | 16. _____ Process Code |
| 17. _____ Process Code | 18. _____ Process Code | 19. _____ Process Code | 20. _____ Process Code |
| 21. _____ Process Code | 22. _____ Process Code | 23. _____ Process Code | 24. _____ Process Code |

List the TURA-reportable chemicals associated with this production unit. If a chemical is associated with ALL the process steps entered in i. above, check ALL. If a chemical is associated with some but not all of the process steps, check the numbers that correspond to the process codes entered in i. above (i.e. box 1 below corresponds to the process code entered in i.1).

j. Production unit number: 01
Prod. Unit #

k. TURA Chemical 79016 TRICHLOROETHYLENE
CAS # Chemical Name

Check "All" or the numbers that correspond to the process codes entered in i. All

| | | | | | | | | | | | |
|--|------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|
| 1. <input checked="" type="checkbox"/> | 2. <input type="checkbox"/> | 3. <input type="checkbox"/> | 4. <input type="checkbox"/> | 5. <input type="checkbox"/> | 6. <input type="checkbox"/> | 7. <input type="checkbox"/> | 8. <input type="checkbox"/> | 9. <input type="checkbox"/> | 10. <input type="checkbox"/> | 11. <input type="checkbox"/> | 12. <input type="checkbox"/> |
| 13. <input type="checkbox"/> | 14. <input type="checkbox"/> | 15. <input type="checkbox"/> | 16. <input type="checkbox"/> | 17. <input type="checkbox"/> | 18. <input type="checkbox"/> | 19. <input type="checkbox"/> | 20. <input type="checkbox"/> | 21. <input type="checkbox"/> | 22. <input type="checkbox"/> | 23. <input type="checkbox"/> | 24. <input type="checkbox"/> |

l. TURA Chemical 7664417 AMMONIA
CAS # Chemical Name

Check "All" or the numbers that correspond to the process codes entered in i. All

| | | | | | | | | | | | |
|------------------------------|--|------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|
| 1. <input type="checkbox"/> | 2. <input checked="" type="checkbox"/> | 3. <input type="checkbox"/> | 4. <input type="checkbox"/> | 5. <input type="checkbox"/> | 6. <input type="checkbox"/> | 7. <input type="checkbox"/> | 8. <input type="checkbox"/> | 9. <input type="checkbox"/> | 10. <input type="checkbox"/> | 11. <input type="checkbox"/> | 12. <input type="checkbox"/> |
| 13. <input type="checkbox"/> | 14. <input type="checkbox"/> | 15. <input type="checkbox"/> | 16. <input type="checkbox"/> | 17. <input type="checkbox"/> | 18. <input type="checkbox"/> | 19. <input type="checkbox"/> | 20. <input type="checkbox"/> | 21. <input type="checkbox"/> | 22. <input type="checkbox"/> | 23. <input type="checkbox"/> | 24. <input type="checkbox"/> |

TURA Production Process Codes Listing by Process Type

Group 1: Processes Typically Used by Firms that Make and Process Objects or Provide Services

General Guide to Group 1 Process Codes: Codes with the prefix "AA" generally refer to processes that add coatings or other matter to a product. The "BB" codes refer to processes that remove matter from a product. The "CC" codes represent processes by which products are given form, shape, physical dimension or other physical properties.

| PROCESS and PROCESS CODE | COMMENTS and EXAMPLES |
|---|---|
| Coating & Painting Processes | Note: firms that use extrusion to coat objects should use the Extruding/Drawing (CC-02) |
| AA-01: Dip, Flow & Curtain Coating | Example: processes where excess coating material is allowed to flow or drain off |
| AA-02: Spray Coating | Example: applying coating as a fine mist or spray Note, however, electrostatic spray coating is included under AA-04 rather than this code |
| AA-03: Knife/Spread/Roll Coating | Example: using a roller, doctor knife or brush to apply coating |
| AA-04: Electrostatic Coating Methods | Examples: electrostatic spray coating, electrostatic powder coating, electrocoating |
| Printing Processes | |
| AA-05: Letterpress & Flexographic | Example: ink applied to a raised surface of printing plate |

| PROCESS and PROCESS CODE | COMMENTS and EXAMPLES |
|--|---|
| AA-06: Lithographic | <p>Example: ink adheres to hydrophobic area/fountain solution adheres to hydrophilic area</p> <p>Use this code to describe the lithographic processes used in semiconductor and printed circuit board manufacturing</p> |
| AA-07: Gravure | <p>Example: ink remains in recessed areas of the plate</p> <p>Includes gravure coating as well as printing</p> |
| AA-08: Screen Printing | <p>Example: ink forced through open or porous areas of screen or plate</p> |
| AA-09: Pad Printing | <p>Example: use of a silicone pad to transfer ink from etched/engraved plate to work piece</p> |
| AA-10: Printing Using Carrier Films or Foils | <p>Examples: hot stamping, in-mold decorating of plastics using films or foils</p> |
| AA-11: Jet Printing | <p>Example: use of jet(s) to apply text or a pattern</p> |
| Plating Processes | |
| AA-12: Electroplating (Barrel) AA-13: Electroplating (Rack) | |
| AA-14: Electroless (Barrel) AA-15: Electroless (Rack) | |
| AA-16: Mechanical Plating | <p>Example: coating a substrate by tumbling or other mechanical means, e.g., using metal powders</p> |

| PROCESS and PROCESS CODE | COMMENTS and EXAMPLES |
|---|---|
| AA-17: Hot Dip Coating (of metal) | Examples: galvanizing, hot tin dipping |
| Processes that penetrate surface layer | |
| AA-18: Anodizing, Conversion Coating and Case Hardening (through diffusion) | <p>Examples: anodizing, black oxide conversion, bright dipping, chromating, passivating, phosphating</p> <p>Includes case hardening through diffusion of substances in the surface layer of metal (e.g., nitriding, nitrocarburizing)</p> <p>For case hardening through the application of energy/heat, see CC-04</p> |
| AA-19: Deposition | Examples: vacuum metallizing, sputtering, metal (flame) spraying |
| Processes that add material throughout the mass of a product | |
| AA-20: Pigmentation/Dyeing | |
| AA-21: Infiltration/Saturation | Example: kraft paper saturation |
| AA-22: Impregnation/Implantation | Examples: (from semiconductor industry) - doping (through diffusion), ion implantation, vacuum impregnation |
| Processes that remove material from product | |
| Product or Parts Cleaning | <p>Removing dirt, grease and other foreign matter from product</p> <p>For drying that occurs as part of cleaning use BB-09</p> |
| BB-01: Solvent-Based | |

| PROCESS and PROCESS CODE | COMMENTS and EXAMPLES |
|---|--|
| BB-02: Aqueous | Includes rinsing |
| BB-03: Mechanical | Examples: sand blasting, cleaning with saw dust |
| Removal of Mass from Substrate (excluding Cleaning) | |
| BB-04: Removal by Chemical Means | Includes bleaching (in textiles), chemical stripping, electropolishing, etching, pickling (of metals) |
| BB-05: Removal by Mechanical Means (<u>Gross Mass Removal</u>) | Includes processes that remove pieces or chips from product; can include cutting, drilling, lathing, turning |
| BB-06: Removal by Mechanical Means (<u>Fine Mass Removal/Size Reduction</u>) | Includes removal methods that produce fine particles/dust; can include abrasive blasting, grinding, milling, polishing (processes that smooth the surface without removing material should be reported as CC-06) |
| BB-07: Removal by Chemical and Mechanical Means | Example: (in paper making) pulping where mechanical and chemical processes are used |
| BB-08: Removal by Application of Heat or Energy | Example: laser cutting |
| BB-09: Drying NOS | Drying not otherwise specified; includes chemical drying |
| Product Molding/Forming | |

| PROCESS and PROCESS CODE | COMMENTS and EXAMPLES |
|--|---|
| CC-01: Casting/Molding | Includes all forms of casting, injection molding, blow molding and similar processes |
| CC-02: Extrusion/Drawing | Includes processes by which a product is given shape by pushing material through a die or similar device Firms that coat products by extrusion should use this code |
| CC-03: Forging | |
| CC-04: Heat Treating NOS | Examples: controlled heating of metal to increase or decrease hardness, improve machinability, relieve stresses etc. (annealing, austempering, tempering and case hardening) |
| CC-05: Quenching | Example: rapid cooling after heat treating through contact with liquids, gases or solids |
| CC-06: Forming by Mechanical Means NOS | Forming by Mechanical Means not otherwise specified Examples: bending, cold heading, embossing, rolling |
| Bonding/Joining | |
| CC-07: Application of Adhesives | |
| CC-08: Soldering/Brazing | |
| CC-09: Welding | |
| CC-10: Sintering/Powder Metallurgy | |

| PROCESS and PROCESS CODE | COMMENTS and EXAMPLES |
|---|--|
| CC-11: Joining through Application of Heat/Energy NOS | Joining through Application of Heat/Energy not otherwise specified |
| CC-12: Joining through Chemical Means NOS | Joining through Chemical Means not otherwise specified |
| CC-13: Joining through Mechanical Means NOS | Joining through Mechanical Means not otherwise specified Examples: cladding |

Group 2: Production Processes Typically Used by Firms that Manufacture and Process Chemicals

| PROCESS and PROCESS CODE | COMMENTS and EXAMPLES |
|---|-----------------------|
| SEPARATION/REFINING | |
| DD-01: Centrifuge/Filtration | |
| DD-02: Distillation | |
| DD-03: Drying | |
| DD-04: Extraction | |
| DD-05: Precipitation | |
| DD-06: Refining/Purification | |
| DD-07: Smelting | |
| CHEMICAL REACTIONS | |
| EE-01: Acetalization | |
| EE-02: Condensation | |
| EE-03: Curing, Vulcanizing, Cross Linking | |
| EE-04: Dehydrogenation | |
| EE-05: Esterification | |
| EE-06: Hydrogenation | |
| EE-07: Oxidation/Reduction | |
| EE-08: pH Adjust | |
| EE-09: Polymerization | |

| | |
|-------------------------------|--|
| EE-10: Substitution Reactions | Includes halogenization and chlorination |
| EE-11: Chemical Reactions NOS | Chemical Reactions not otherwise specified |

Group 3: Miscellaneous Processes that could be used by any firm

| PROCESS and PROCESS CODE | COMMENTS and EXAMPLES |
|---------------------------------------|--|
| Production Equipment Cleaning | Examples: cleaning of vessels, process lines, printing plates, such devices as spray guns. Also includes descaling of boilers NOTE: Equipment cleaning includes SANITIZING |
| FF-01: Solvent-Based | |
| FF-02: Aqueous | Example: use of caustic solutions to clean production equipment |
| FF-03: Mechanical | Example: use of wiper blades, squeegees |
| Materials Storage/Handling | |
| GG-01: Blending, Mixing, Compounding | |
| GG-02: Particle Size Reduction | Example: grinding mills |
| GG-03: Packaging/Filling | Examples: bottling liquid products, repackaging |
| GG-04: Materials Storage/Handling NOS | Materials Storage Handling not otherwise specified Use for storage and handling processes that generate losses such as spills or evaporative losses |
| Treatment of Process Water | |
| HH-01: Deionization, Demineralization | Examples: deionization, water softening, including associated process like regeneration of deionization resins |

| | |
|--|---|
| HH-02: Use of Biocides/Disinfection | Examples: water chlorination, use of algaecides in cooling towers |
| HH-03: pH Control of Process Water NOS | pH Control of Process Water (including water in boilers), not otherwise specified |
| Refrigeration/Temperature Control | |
| II-01: Refrigeration | |
| II-02: Heat Exchange Unit | |
| II-03: Contact Cooling NOS | Contact Cooling not otherwise specified Do not use for quenching. Quenching is CC-05 |
| II-04: Noncontact Cooling NOS | Noncontact Cooling not otherwise specified |
| Power Generation | |
| JJ-01: Production of Electricity, Steam, Facility Heat | Applies to processes producing electricity, steam or heat through combustion, includes co-generation Note: use an FF code for equipment cleaning associated with power production and a HH code for treatment of cooling or boiler water |

TURA Production Process Codes: Alphabetized Listing of Group 1 and 3

MassDEP has prepared the following alphabetical listing of some of the more commonly reported production processes with cross-references to the recommended codes listed above. This appendix explains how to use generic codes to report on production processes in the Form S Cover Sheet. The alphabetical list covers selected processes from Groups 1 and 3 of the codes listed in “TUR Production Process Codes by Process Type” above.¹⁰(Firms that are primarily in the chemical manufacturing

¹⁰TUR Production Process Codes by Process Type”divides the codes into three groups: Group 1 lists processes typically used by firms that primarily make or process objects (or provide services). Group 2 lists processes typically used by firms that are primarily in the chemical manufacturing SIC codes.

NAICS codes should also refer to the Group 2 codes. The processes associated with chemical manufacturing are not included in this alphabetical list.)

“TUR Production Process Codes by Process Type” should also be consulted to confirm the applicability of a code. While the appendix and this list are intended to provide guidance, each filer is encouraged to use his or her best judgment concerning which code(s) adequately describes its processes.

IMPORTANT NOTE ON THE "MOST LIKE" AND "NOT OTHERWISE SPECIFIED" CODING:

“TUR Production Process Codes by Process Type” divides the codes into subgroups, such as CC-01 through CC-06 for the product molding and forming codes. Some of the subgroups contain one or more codes containing the abbreviation "NOS" for "not otherwise specified."

Each NOS code is a default code for its group. For example, CC-06 (Forming by Mechanical Means NOS) should be used for any mechanical product forming process other than those specifically named in its group (e.g., casting, molding, extrusion, etc.). The use of the "most like" coding method discussed above should only be used as a last resort, i.e., if there is no applicable code, NOS or otherwise.

ALPHABETICAL LISTING OF PRODUCTION PROCESSES

| <u>Process Step</u> | <u>Cross-Reference / Comment</u> |
|--------------------------|---|
| abrasive blasting | <i>see codes listed below under "removal of mass from substrate"</i> |
| acid aging | see <u>AA-20</u> (Pigmentation/Dyeing), for acid aging as a step in dyeing |
| annealing | see <u>CC-04</u> (Heat Treating NOS) |
| anodizing | see <u>AA-18</u> (Anodizing, Conversion Coating & Case Hardening [through diffusion]) |
| application of adhesives | see <u>CC-07</u> (Application of Adhesives - Bonding/Joining) |

Group 3 lists miscellaneous processes that might be used by any firm regardless of whether objects or chemicals are made/processed (or services provided).

| | |
|--------------------------|---|
| aqueous-based cleaning | see FF-02 (Aqueous Cleaning of Production Equipment) of production equipment |
| aqueous-based cleaning | see BB-02 (Aqueous Cleaning of Product or Parts) of work product |
| austempering | see CC-04 (Heat Treating NOS) |
| bending | see CC-06 (Forming by Mechanical Means NOS) |
| black oxide | see AA-18 (Anodizing, Conversion Coating & Case Hardening conversion coating [through diffusion]) |
| blanking | <i>see codes listed below under "removal of mass from substrate"</i> |
| bleaching | see BB-04 (Removal by Chemical Means) |
| blending | see GG-01 (Blending, Mixing, Compounding) |
| blow molding | see CC-01 (Casting/Molding) |
| bonding/joining | see as appropriate: CC-07 (Application of Adhesives) CC-08 (Soldering/Brazing) CC-09 (Welding) CC-10 (Sintering/Powder Metallurgy) CC-11 (Joining through Application of Heat/Energy NOS) CC-12 (Joining through Chemical Means NOS) CC-13 (Joining through Mechanical Means NOS) |
| boring | <i>see codes listed below under "removal of mass from substrate"</i> |
| bottling liquid products | see GG-03 (Packaging/Filling) |
| brazing | see CC-08 (Soldering/Brazing) |
| bright dipping | see AA-18 (Anodizing, Conversion Coating & Case Hardening [through diffusion]) if bright dipping is |

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| | intended to alter the chemical structure of the workpiece's surface |
| | see <u>BB-04</u> (Removal by Chemical Means) if bright dipping is intended to remove mass from the |
| workpiece broaching | see codes listed below under "removal of mass from substrate" |
| brush-on coating | see <u>AA-03</u> (Knife/Spread/Roll Coating) |
| buffing | see as appropriate: <u>CC-06</u> (Forming by Mechanical Means NOS), if the process is <u>not</u> intended to remove material from the work piece |
| | <i>codes listed below under "removal of mass from substrate," if the process is intended to remove material from the work piece</i> |
| burnishing | see as appropriate: <u>CC-06</u> (Forming by Mechanical Means NOS), if the process is <u>not</u> intended to remove material from the work piece <i>codes listed below under "removal of mass from substrate," if the process is intended to remove material from the work piece</i> |
| calendering | see <u>CC-06</u> (Forming by Mechanical Means NOS) |
| case hardening | see <u>AA-18</u> (Anodizing, Conversion Coating & Case Hardening [through diffusion]), includes processes such as nitriding |
| case hardening by heat treating | see <u>CC-04</u> (Heat Treating NOS) |
| casting | see <u>CC-01</u> (Casting/Molding) |
| chemical drying | see <u>BB-09</u> (Drying NOS), if chemical drying refers, for example, to the use solvents for drying a work product see <u>DD-03</u> (Drying) for chemical manufacturers that dry chemicals |
| chemical stripping | see <u>BB-04</u> (Removal by Chemical |

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| chromating | see AA-18 (Anodizing, Conversion Coating & Case Hardening [through diffusion]) |
| cladding | see CC-13 (Joining through Mechanical Means (NOS) leaning of production equipment see as appropriate: FF-01 (Solvent-Based Cleaning of Production Equipment) FF-02 (Aqueous Cleaning of Production Equipment) FF-03 (Mechanical Cleaning of Production Equipment) cleaning of work product see as appropriate: BB-01 (Solvent-Based Cleaning of Product or Parts) BB-02 (Aqueous Cleaning of Product or Parts) BB-03 (Mechanical Cleaning of Product or Parts) |
| co-extrusion | see CC-02 (Extrusion/Drawing) |
| co-generation Heat) | see JJ-01 (Production of Electricity, Steam, Facility Heat) |
| cold heading | see CC-06 (Forming by Mechanical Means NOS) |
| compounding | see GG-01 (Blending, Mixing, Compounding) |
| contact cooling | see II-03 (Contact Cooling NOS) or quenching, however, use CC-05 (Quenching) |
| conversion coating | see AA-18 (Anodizing, Conversion Coating & Case Hardening [through diffusion]) |
| conveyorized degreasing | <i>see codes listed above under "cleaning of work product"</i> |
| crystal growth | see AA-19 (Deposition) |
| curtain coating | see AA-01 (Dip, Flow & Curtain Coating) |
| cutting | <i>see codes listed below under "removal of mass from substrate"</i> |
| deburring | <i>see codes listed below under "removal of mass from substrate"</i> |


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| degreasing <i>product</i> | <i>see codes listed above under "cleaning of work</i> |
| deionization | <i>see <u>HH-01</u> (Deionization, Demineralization), includes the regeneration of deionization resins (of process water)</i> |
| demineralization | <i>see <u>HH-01</u> (Deionization, Demineralization)</i> |
| deposition | <i>see <u>AA-19</u> (Deposition) use this code for processes that in deposit thin films (usually of metal) and for crystal growth (includes metal [flame] spraying, sputtering, vacuum metallizing)</i> |
| descaling of boilers | <i>see codes listed above under "cleaning of production equipment"</i> |
| descaling of work product | <i>see codes listed below under "removal of mass from substrate"</i> |
| desmutting | <i>see codes listed below under "removal of mass from substrate"</i> |
| dip coating | <i>see <u>AA-01</u> (Dip, Flow & Curtain Coating)</i> |
| disinfection | <i>see <u>HH-02</u> (Treatment of Process Water: Use of of process water Biocides/Disinfection)</i> |
| doping (through diffusion) | <i>see <u>AA-22</u> (Impregnation/Implantation)</i> |
| drawing | <i>see <u>CC-02</u> (Extrusion/Drawing)</i> |
| drilling | <i>see codes listed below under "removal of mass from substrate"</i> |
| dry cleaning (of clothes) | <i>see codes listed above under "cleaning of work product"</i> |
| drying (of work product) | <i>see <u>BB-09</u> (Drying NOS)</i> |
| dyeing | <i>see <u>AA-20</u> (Pigmentation/Dyeing)</i> |
| electric power generation Heat) | <i>see <u>JJ-01</u> (Production of Electricity, Steam, Facility Heat)</i> |
| electrocoating | <i>see <u>AA-04</u> (Electrostatic Coating Methods)</i> |

electroless plating (barrel) see [AA-14](#) (Electroless Plating [Barrel])
 electroless plating (rack) see [AA-15](#) (Electroless Plating [Rack])
 electroplating (barrel) see [AA-12](#) (Electroplating [Barrel])
 electroplating (rack) see [AA-13](#) (Electroplating [Rack])
 electropolishing see [BB-04](#) (Removal by Chemical Means)
 electrostatic coating methods see [AA-04](#) (Electrostatic Coating Methods)
 electrostatic powder coating see [AA-04](#) (Electrostatic Coating Methods)
 electrostatic spray coating see [AA-04](#) (Electrostatic Coating Methods)
 embossing see [CC-06](#) (Forming by Mechanical Means NOS)
 equipment cleaning *see codes listed above under "cleaning of production equipment"*
 etching see [BB-04](#) (Removal by Chemical Means)
 extrusion see [CC-02](#) (Extrusion/Drawing)
 filling see [GG-03](#) (Packaging/Filling)
 flame and arc cutting see [BB-08](#) (Removal by Application of Heat or Energy)
 flexographic printing see [AA-05](#) (Letterpress & Flexographic Printing)
 flow coating see [AA-01](#) (Dip, Flow & Curtain Coating)
 foam molding see [CC-01](#) (Casting/Molding)
 forging see [CC-03](#) (Forging)
 forming by mechanical
 means NOS see [CC-06](#) (Forming by Mechanical Means NOS)
 mechanical forming processes other than casting/molding (CC-01), extrusion/drawing (CC-02) or forging (CC-03)
 galvanizing see as appropriate:
[AA-17](#) (Hot Dip Coating of Metal)

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| | <u>AA-12</u> (Electroplating, Barrel) & <u>AA-13</u> (Electroplating, Rack), if galvanizing is by electroplating |
| gravure printing | see <u>AA-07</u> (Gravure) |
| gravure coating | see <u>AA-07</u> (Gravure) |
| grinding | see as appropriate: <i>codes listed below under "removal of mass from substrate"</i> <u>GG-02</u> (Particle Size Reduction) for grinding of chemicals, as in grinding of paint pigments |
| heat exchange unit | see <u>II-02</u> (Heat Exchange Unit) |
| heat treating | see <u>CC-04</u> (Heat Treating NOS) |
| hobbing | <i>see codes listed below under "removal of mass from substrate"</i> |
| hot dip coating (of metal) | see <u>AA-17</u> (Hot Dip Coating of Metal) |
| hot stamping | see <u>AA-10</u> (Printing Using Carrier Films or Foils) (printing) |
| hot tin dipping | see <u>AA-17</u> (Hot Dip Coating of Metal) |
| implantation | see <u>AA-22</u> (Impregnation/Implantation) |
| impregnation | see <u>AA-22</u> (Impregnation/Implantation) |
| in-mold decorating of plastics | see <u>AA-10</u> (Printing Using Carrier Films or Foils) using films or foils |
| infiltration | see <u>AA-21</u> (Infiltration/Saturation) |
| injection molding | see <u>CC-01</u> (Casting/Molding) |
| ion implantation | see <u>AA-22</u> (Impregnation/Implantation) |
| jet printing | see <u>AA-11</u> (Jet Printing) |
| knife coating | see <u>AA-03</u> (Knife/Spread/Roll Coating) |
| knife over roll coating | see <u>AA-03</u> (Knife/Spread/Roll Coating) |
| kraft paper saturation | see <u>AA-21</u> (Infiltration/Saturation) |

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| laser cutting | see BB-08 (Removal by Application of Heat or Energy) |
| lathing | <i>see codes listed below under "removal of mass from substrate"</i> |
| letterpress printing | see AA-05 (Letterpress & Flexographic Printing) |
| lithographic printing | see AA-06 (Lithographic) |
| machining | <i>see codes listed below under "removal of mass from substrate"</i> |
| materials storage/handling | see as appropriate: GG-01 (Blending, Mixing, Compounding) GG-02 (Particle Size Reduction) GG-03 (Packaging/Filling) GG-04 (Materials Storage Handling NOS) |
| mechanical plating | see AA-16 (Mechanical Plating) |
| metal (flame) spraying | see AA-19 (Deposition) |
| milling | <i>see as appropriate: codes listed below under "removal of mass from substrate"</i> GG-02 (Particle Size Reduction) as in the use of grinding mills |
| mixing | see GG-01 (Blending, Mixing, Compounding) |
| molding | see CC-01 (Casting/Molding) |
| neutralization | if neutralization is a step in a coded process, use that code for that process, for example, if neutralization is a step in dyeing, the appropriate code would be AA-20 (Pigmentation/Dyeing) if neutralization is used in the manufacture of a chemical, use EE-08 (pH Adjust) |
| nitriding | see AA-18 (Anodizing, Conversion Coating & Case Hardening [through diffusion]) |

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| nitrocarburizing | see AA-18 (Anodizing, Conversion Coating & Case Hardening [through diffusion]) |
| noncontact cooling | see II-04 (Noncontact Cooling NOS) (where cooling fluid is kept separate from the production process) |
| packaging | see GG-03 (Packaging/Filling) |
| pad printing | see AA-09 (Pad Printing) |
| particle size reduction | see GG-02 (Particle Size Reduction), for processes such as the grinding of paint pigments |
| passivating | see AA-18 (Anodizing, Conversion Coating & Case Hardening [through diffusion]) |
| pH control | see HH-03 (pH Control of Process Water [including water in of process water boilers] NOS) |
| photolithography | see AA-06 (Lithographic) |
| phosphatizing | see AA-18 (Anodizing, Conversion Coating & Case Hardening [through diffusion]) |
| pickling (of metals) | see BB-04 (Removal by Chemical Means) |
| pigmentation | see AA-20 (Pigmentation/Dyeing) |
| polishing | <i>codes listed below under "removal of mass from substrate," if material is removed from work piece</i> |
| polishing (continued) | CC-06 (Forming by Mechanical Means NOS) if material is <u>not</u> removed from work piece |
| powder metallurgy | see CC-10 (Sintering/Powder Metallurgy) |
| pressure treating (wood) | see AA-22 (Impregnation/Implantation) |
| printing using | see AA-10 (Printing Using Carrier or Filmcarrier films or Foils) |

 **NOTE:** some mechanical "removal" processes (e.g., polishing) can be used either to remove material or to smooth the surface of a product without removing material. The code for such mechanical surface "smoothing" is [CC-06](#) (Forming by Mechanical Means NOS).

pulping (in paper making) see as appropriate:

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| | <u>BB-05</u> (Removal by Mechanical Means - Gross Mass Removal) |
| | <u>BB-06</u> (Removal by Mechanical Means - Fine Mass Removal) |
| | <u>BB-07</u> (Removal by Chemical & Mechanical Means) |
| punching | see codes listed below under "removal of mass from substrate" |
| quenching | see <u>CC-05</u> (Quenching) |
| refrigeration | see <u>II-01</u> (Refrigeration) |
| regeneration of deionization | |
| resins | see <u>HH-01</u> (Deionization, Demineralization) |
| removal of mass from | |
| substrate | refers to processes which can be used to a work product, generally, excluding the removal of dirt or grease cleaning as in removal The six removal codes are: <u>BB-04</u> (Removal by Chemical Means) <u>BB-05</u> (Removal by Mechanical Means -- Gross Mass Removal), to be used if process removes pieces or chips <u>BB-06</u> (Removal by Mechanical Means -- Fine Mass Removal/ Size Reduction), to be used if process produces fine particles or dust <u>BB-07</u> (Removal by Chemical & Mechanical Means) <u>BB-08</u> (Removal by Application of Heat or Energy) <u>BB-09</u> (Drying NOS) for drying work products |
| repackaging | see <u>GG-03</u> (Packaging/Filling) |
| reverse roll coating/printing | see <u>AA-03</u> (Knife/Spread/Roll Coating) |

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| rinsing | see BB-02 (Aqueous Cleaning of Product or Parts) |
| roll coating | see AA-03 (Knife/Spread/Roll Coating) |
| rolling | see CC-06 (Forming by Mechanical Means NOS) |
| rotary screen printing | see AA-08 (Screen Printing) |
| sand blasting | <i>see codes listed above under "removal of mass from substrate"</i> |
| sanitizing | |
| (production equipment) | <i>see codes listed above under "cleaning of production equipment"</i> |
| saturation | see AA-21 (Infiltration/Saturation) |
| sawing | <i>see codes listed above under "removal of mass from substrate"</i> |
| semi-aqueous cleaning | see BB-01 (Solvent-Based Cleaning of Product or of work product parts) |
| scouring (textile products) <i>product"</i> | <i>see codes listed above under "cleaning of work</i> |
| screen printing | see AA-08 (Screen Printing) |
| shearing | <i>see codes listed above under "removal of mass from substrate"</i> |
| sintering | see CC-10 (Sintering/Powder Metallurgy) |
| soldering | see CC-08 (Soldering/Brazing) |
| solvent-based cleaning | see FF-01 (Solvent-Based Production Equipment of production equipment Cleaning) |
| solvent-based cleaning | see BB-01 (Solvent-Based Cleaning of Product or of work product Parts) |
| solvent drying | see BB-09 (Drying NOS), for the use solvents to dry a product or work piece |
| spray coating | see AA-02 (Spray Coating) (does not include electrostatic spray coating) |

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| | see AA-04 (Electrostatic Coating Methods) for electrostatic spray coating |
| spread coating | see AA-03 (Knife/Spread/Roll Coating) |
| sputtering | see AA-19 (Deposition) |
| steam generation via | |
| combustion | see JJ-01 (Production of Electricity, Steam, Facility Heat) |
| straightening | see CC-06 (Forming by Mechanical Means NOS) |
| tempering | see CC-04 (Heat Treating NOS) |
| trimming | <i>see codes listed above under "removal of mass from substrate"</i> |
| tumbling | see as appropriate: AA-16 (Mechanical Plating), if tumbling is used to plate <i>codes listed above under "removal of mass from substrate," if tumbling is used to remove mass from a work product, such as tumbling to deburr</i> CC-06 (Forming by Mechanical Means NOS), if tumbling is used to smooth a work product without removing mass turning <i>see codes listed above under "removal of mass from substrate"</i> |
| ultrasonic cleaning of parts | <i>see codes listed above under "cleaning of work product"</i> |
| use of biocides process | see HH-02 (Treatment of Process Water: Use of in water/cooling towers Biocides/Disinfection) |
| use of squeegees/wiper blades/rags | <i>see codes listed above under "cleaning of production equipment" to clean production equipment</i> |
| vacuum impregnation | see AA-22 (Impregnation/Implantation) |
| vacuum metallizing | see AA-19 (Deposition) |
| vapor degreasing | <i>see codes listed above under "cleaning of work product"</i> |

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| water deionization | see HH-01 (Deionization, Demineralization) |
| water chlorination | see HH-02 (Treatment of Process Water: Use of Biocides/Disinfection) |
| water softening | see HH-01 (Deionization, Demineralization) |
| welding | see CC-09 (Welding) |

Appendix I: Production Units

The Form S contains both facility-wide and process-specific information. Facilities report information on the quantity of chemical used and the amount generated as byproduct (waste) on a facility-wide level. Any progress in reducing byproduct through the implementation of toxics use reduction is measured and reported at the process (or "production unit") level.

A **production unit** is "a process, line, method, activity, or techniques, or a combination or series thereof, used to produce a product or a family of products."

A **product** means "a product, family of products, an intermediate product, a family of intermediate products, or a desired result or family of results."

A **result** is, for example, clean laundry after an industrial cleaning process.

A **family of products** is, for example, three different rubber compounds grouped together as one product.

Intermediate product is, for example: A chemical manufacturer produces methanol as an intermediate step in the production of formaldehyde. The methanol can be considered a product.

With these definitions TURA gives facilities flexibility in how they divide their facility into production units:

- A production unit can include all of the processes used to produce an individual item such as a particular shade of paint or a plated knife, or produce a desired result such as cleaned out lines and mixing vats.
- Products can be grouped together into a family of products so that, for instance, all of the processes used to create several different shades of paint could be considered one production unit.
- An individual process step such as degreasing coupled with the result of that step (for example, a degreased piece of metal), can be considered a separate production unit.
- Separate process lines that make the same product can be considered as one production unit.

For guidance on factors that should be considered when establishing production units, please refer to MassDEP's "Guidelines for Classifying Production Units". This can be obtained on the MassDEP web site at: <https://www.mass.gov/media/1784276>.

In addition to identifying production units, facilities must also establish a "unit of product." There are two basic explanations for a decline in the quantity of chemical generated as byproduct: 1) there could have been a drop in production levels; or 2) through the implementation of TUR, less byproduct could have been generated per unit of product produced.

In order to distinguish byproduct reductions that occur through declines in production from those that occur because of the implementation of TUR, production level reporting is done on a "per unit of product" basis.

As with production units, facilities are free to select the unit of product. The key to choosing a unit of product is that the measure should be a reliable indicator of changes in production levels. The unit of product should be one that reliably increases or decreases as production goes up or down. The Guidelines for Classifying Production Units discusses considerations for selecting a unit of product.

In most cases, an acceptable choice will be a physical measure such as pounds of ammonia manufactured by the production unit or square yards of printed fabric.

✓ Example

| Example | Units of Product |
|----------------------|---------------------------------|
| No. of Products/year | No. of wood chairs |
| Square feet/year | square feet of anodized parts |
| Pounds/year | pounds of formaldehyde produced |
| Gallons/year | gallons of paint produced |

Sometimes, however, it may not be possible to identify a physical measure that reliably reflects outputs. In such a case, a non-physical measure may be used as a way to quantify changes in production. Examples of this may include: hours of operation, labor hours, and dollar sales.

Non-physical measures can be affected by things that have nothing to do with changing levels of production. For instance, dollar sales will be influenced by changes in inflation, or perhaps, by product pricing. Labor hours might be less reliable if there has been a mid-year shift to automation, making output more efficient.

If you chose a non-physical unit of product, you must provide a written explanation as to why a physical measure cannot be used. You must also state how the non-physical measure has been adjusted to accurately reflect production levels rather than changes in costs, prices, inventory, productivity or other factors.

Appendix J: Production Unit Guidelines

Introduction

The Toxics Use Reduction Act (TURA) was established in 1989 to promote environmental protection, worker safety, and public health through reductions in the use of toxic and hazardous substances. This law requires that firms report on toxic use and develop toxic use reduction plans for the individual "production units" (or production processes) employed at their facility.

MassDEP is required to develop regulations for classifying similar production units into "user segments." These guidelines describe how firms should identify production units at their facilities.

Toxics use reduction encompasses a range of techniques such as product reformulation, changes in raw materials, or improved operation and maintenance. These techniques are designed to eliminate/reduce "wastes" before they are produced.

TURA has certain reporting, and in later years, planning requirements designed to help businesses identify toxics use reduction opportunities within their firms. The law's provisions incorporate approaches used by companies that have successfully implemented toxics use reduction.

Typically, these companies began their efforts by taking a close look at individual products and processes used to make the products. With that focus, a firm can identify different or more efficient production methods that eliminate/reduce toxic chemical byproducts or the use of toxic substances and save money.

TURA incorporates that thinking by establishing the PRODUCTION UNIT (the combination of a product and process) as the arena for achieving reductions and as the basic unit of reporting, planning, and technical programs.

What Is A Production Unit & Why Is It Important?

TURA defines a "production unit" as: "a process, line, method, activity, or technique, or a combination or series thereof, used to produce a product (or family of products)."

A production unit is **not** the process **or** the product. It is the **combination** of the process and the products produced by that process.

PRODUCTION UNIT = PROCESS + PRODUCT

Here are some examples of processes and products designated as production units:

Dry Cleaning Machine #1 used to **Clean Clothing**
Assembly, Primer Coating of Desks
Plating Line #2 used to plate **Chrome Fixtures**

TURA requires that firms examine their activities and establish such combinations of processes and products as production unit(s). A production unit - focus helps establish a connection between the chemicals used/the waste produced and the products/activities involved.

That connection is reinforced by TURA's reporting requirements. In the annual toxics use reports, regulated firms identify the production unit(s) in which a TURA-regulated chemical is manufactured, processed, or otherwise used.

For each production unit, the information to be provided includes calculations of a **byproduct reduction index** and an **emissions reduction index**, which are ratios expressing year-to-year progress in reducing byproducts and emissions per unit of product.

With regard to future planning, TURA calls on regulated firms to establish a process for identifying/evaluating toxics use reduction opportunities for each such unit.

Designating production units is key to other aspects of TURA as well. As the Act directs, MassDEP will issue regulations on grouping production units with similar products and processes into "user segments" -- based on a number of considerations, including a review of the production units identified by firms identify in the first annual toxics use report.

The user segment groupings will then be used to set priorities for technical assistance (provided by the Office to Technical Assistance), and research and demonstration projects (sponsored by the Toxics Use Reduction Institute at the University of Lowell).

While these GUIDELINES focus on designating production units for reporting and planning, it is important to keep in mind the larger role the concept has in TURA.

How Do I Classify My Production Units?

Classifying or, more accurately, designating production units is somewhat like drawing boxes around the activities and products in your firm. You could, for example, draw a box around one machine, link that machine to a product, and call that combination a production unit. You could draw a box around a process line, around a number of process lines, or conceivably around your whole plant.

While your approach must be consistent with TURA, its regulations and policies, firms have flexibility in designating production units. Firms are encouraged, moreover, to classify production units in a way that is most useful for identifying toxics use reduction opportunities and documenting progress in reducing toxic byproducts.

MassDEP has developed a procedure for designating production units. This procedure is not a requirement – it is presented to be helpful to technical and non-technical staff alike.

While the steps in this process are listed sequentially below, the concepts involved -- and the decisions you will be making - are intertwined.

Step One: Identify the Processes at Your Facility

Step Two: Identify Your Facility's Products

Step Three: Designate Process/Product Combination(s) as a Production Unit(s)

After discussing the steps in this procedure, these **GUIDELINES** will provide examples of how the choices you make in designating **production units** relate to TURA reporting requirements.

Step One: Identify the Processes at Your Facility

The first step in classifying production units is to identify the discrete process steps or activities conducted at your facility, sometimes referred to as "unit operations" or "unit processes."

Then you should identify the unit operations in which a TURA-regulated chemical [Endnote 1] is: (1) manufactured, processed, or otherwise used, or (2) generated as a byproduct or an emission.

TURA allows you to group unit operations together for the purpose of designating production units. Note, however, that: **Generally, every unit operation involving a TURA-regulated chemical must be accounted for in at least one production unit.** [Endnote 2]

It is important here that you be as thorough and methodical as you can, particularly in identifying the unit operations involving TURA-regulated chemicals. The following example illustrates this point.

EXAMPLE:

An airline company built a wastewater treatment plant to handle discharges containing chromium substances. When the plant failed to work as expected, the company further analyzed chromium use. They found that they could have **eliminated the chromium byproduct** by switching from aqueous to abrasive methods of removing paint from airplanes being reconditioned. Had they discovered this sooner, the treatment plant would not have been built.

This example underscores the need to focus on **all** the activities associated with the making of a product (not just the direct manufacturing activities). To identify your processes look broadly to: (a) storage/handling of input materials, (b) processing/use of materials in production, and (c) assemble/packaging of final products.

You should also consider intermittent processes such as equipment maintenance, tank clean-out and solution make-up.

Process flow diagrams are a useful source of information on the unit operations at a firm. Below is a much simplified diagram showing **some** of the unit operations in paint manufacturing. (A complete diagram would obviously have much more information.)

BLENDING --> FILTRATION --> PACKAGING --> Paint

Your firm may have prepared much more elaborate process flow diagrams to estimate annual toxic chemical releases and off-site transfers for FORM R reporting under EPCRA. If not, such diagrams may have been prepared in the course of:

- Developing management systems (e.g., designating cost centers);
 - Planning facility upgrades;
 - Responding to other environmental reporting/permitting requirements;
- or
- Conducting toxics use reduction activities.

If process flow diagrams are available, you should make sure that production steps/processes have not changed since the diagrams were prepared. If process flow diagrams are not available, a plant tour and discussions with production personnel will help you identify your firm's processes so you can prepare such diagram(s).

Good process flow diagrams will be useful not only for designating production units but also for future toxics use reduction planning.

The flow diagrams should depict all the unit operations in your facility processes or activities that occur to at least the level of detail that is acceptable for production planning in your industry. You then should focus on identifying those operations "associated" with a TURA-regulated chemical.

To do so, the process flow diagram should be drawn (as is common) to depict the flow of materials (particularly the chemicals regulated by TURA). With a diagram depicting material streams and discussions with technical personnel and production staff, you can identify the specific unit operations which involve a TURA-regulated chemical -- as an input, output or throughput. You should also identify valves and other junctures where fugitive emissions of TURA-regulated chemicals occur.

As stated earlier, TURA allows you to group unit operations for the purpose of designating production units, as long as every operation involving a TURA-regulated chemical is accounted for in at least one such unit.

Many times, final decisions on grouping unit operations may not be made until you begin to designate product/process combinations (STEP THREE in these GUIDELINES). Initially, you may attempt to aggregate unit operations, but you should then ask, "Should a given operation be treated separately?" Sometimes there are very good reasons to do so.

EXAMPLE:

A manufacturer makes and sells painted and unpainted appliances. One TURA-regulated chemical is used in various cleaning steps for both types of appliances, but the painted ones undergo an additional cleaning step involving another chemical.

The manufacturer could group the steps common to all appliances into a single process. The cleaning step for painted appliances might be treated as a separate production unit. This approach depicts the product mix and usage of chemicals at the facility more accurately than grouping all the steps for all the appliances together would.

Generally, parallel process lines MAY be grouped together unless they involve different technologies, chemical usage, or they produce different products. If significant differences

exist, they should be treated separately. Again, final decisions on aggregating or disaggregating unit operations will probably be made at STEP THREE, after you have identified the products produced by your firm as described below.

Step Two: Identify Your Products

Under TURA, a "product" is:

"a product, a family of products, an intermediate product, a family of intermediate products, or a desired result or a family of results."

In some ways, the TURA definition of product is broader than the common understanding of the term. Intermediate products are considered "products" under the statute, as are certain "results." Also, the definition of "intermediate product" may encompass "outputs" other than those considered as such in your industry.

Asking the following questions will help you identify and classify your firm's PRODUCTS for TURA reporting and planning.

QUESTION 1: What products or intermediate products did the firm produce during the reporting year?

QUESTION 2: Can/should these products be treated as separate products or grouped into families?

What products or intermediate products did the firm produce during the reporting year?

As a first step in determining what products your firm produced, you should assume -- at least initially -- that any product or intermediate product that is identified as such in your accounting, inventory or manufacturing information systems is a product.

After you identify products (and intermediate products) from existing information sources, you should consider whether your firm produces any other items that might meet the broad TURA definition of "product."

Consider whether there are any "outputs," not commonly considered intermediate products that might be classified as intermediate products. Note that under TURA, a chemical substance or other product can be considered an intermediate product if it is:

Produced to be used intentionally in the manufacture of another product OR

Taken out of the production process and transferred off-site, to another production unit, to storage, or through a finishing process.

Common examples of intermediate products include: (1) a chemical (phenol) that is sold as a product and used to produce another chemical product (aniline), or (2) unpainted appliances shipped off-site by a manufacturer that makes and sells painted and unpainted appliances.

Phenol and the unpainted appliance would probably be considered intermediate products within their respective industries. The following example illustrates a case where something that is not usually viewed as an intermediate product might be treated as such.

EXAMPLE:

An electronics component manufacturer produces deionized water that is used (for cleaning) in the production of printer circuit boards. Under the TURA definition, the manufacturer could call deionized water an intermediate product. In that case, the unit operations associated with the production of deionized water could be grouped together, linked with that "product" and called one PRODUCTION UNIT.

Similarly, there are some results that a firm might usefully consider to be products. In the non-manufacturing sector, a result might include a service or something less concrete like the production of electricity. Even in manufacturing, there may be certain results that could be treated as products.

The option of treating results as products is something to keep in mind. At this point in your analysis, however, your major effort should be identifying the products and intermediate products produced by your firm. Having done so, the next question is:

Can/should these products be treated as separate products or grouped into families?

If your firm produces one, truly homogeneous product, this question is not an issue. Many firms, however, have different, varying products and product lines.

Under TURA, similar products may be classified into a "family of products," so that the process used to produce them can be considered one production unit.

To determine if products can be grouped or should be treated separately, you need to have a sense of how similar (or different) they are. Are the same (or different) processes used to produce the products? Are the products similar (or different) in terms of the usage of a TURA-regulated chemical(s) or in the production of regulated chemical(s) as byproducts or emissions?

Often, judgment is called for in deciding whether to group products into families or treat them separately. Some simple principles that might be useful are set forth below, with examples. (While the examples refer to similarities or differences in chemical usage, it is equally important to consider the processes used to create products, and the byproducts/emissions generated by those processes.)

You can group products into families if there are no significant differences in the technologies used to produce them, the usage of chemicals, or the creation of byproducts/emissions.

EXAMPLE:

A battery maker produces lead acid batteries of the same size/shape, using the same production processes and involving the usage of the same amounts of lead compounds, a TURA-regulated chemical.

The various batteries have certain internal elements made of differing materials, such as silicon, clay or paper -
- none of which are listed chemicals.

Although sales records list and price the batteries as different "products," the manufacture could group them into a family for TURA purposes.

You may group products into families if you are assured any differences are minor or statistically insignificant.

EXAMPLE:

A firm mass-produces 500,000 transformers a year. While these products are uniform in every way, the firm also makes 50 special order transformers. The special orders involve usage of a listed chemical that varies considerably from that of the mass produced items.

This firm has a decision to make. The firm might decide to group all the transformers into a family of products, especially if the special orders are expected to remain a constant, and statistically insignificant, part of its business.

You should treat products as separate production if significant differences exist.

EXAMPLE:

A firm produces two types of microfilm on one process line. The steps in the process are the same for each type of microfilm *except* that in one of the process steps a TURA-regulated chemical is used to produce one and not the other. The two types of microfilm should be treated as separate products and not grouped into families

While these three principles may not cover every situation, you should use them to guide your thinking on how your final products should be treated. Once you have identified the products produced by your facility, you can then link them to the processed identified earlier. The next section describes how to combine these "building blocks" to make **production units** useful for TURA reporting and planning.

Step Three: Designate Product/Process Combination(s) as Production Unit(s)

TURA affords firms flexibility in designating product/process combinations as production units. Here are some examples of possible combinations:

1 Production Unit = 1 Process + 1 Product : A facility with a single product and a single production process has one production unit.

For example, the production of car batteries through one process.

1 Production Unit = 1 Process + A Family of Products : A facility with similar products may group these into a family, so that the process used to produce them can be considered one production unit.

For example, the production of miscellaneous engine parts through one process.

2 Production Units = 1 Process + 2 Products: A facility with a single production process making two distinct products (not the same family) should designate these process/product combinations as two production units.

For example, the production of unpainted appliances (intermediate product) and painted appliances through one process.

These examples reflect the combinations possible as a result of whether products are treated separately or grouped into families. The examples are based on situations where a firm has one process. Additional combinations are possible depending on the number of processes in a facility and how those are treated.

The more products and process steps you treat separately, the more production units you will have. On the other hand, if you group products into families and aggregate process steps, you will have fewer production units.

Your main concern, however, should be to designate production units in a manner that most accurately reflects the activities and products of your facility. Keep in mind that products and processes can change over time. If, for example, your firm has one stable product line and another that is expected to change, you might want to put each into a separate production unit.

You should take into account the availability of information and its reliability. If, for example, relevant information on separate production lines is kept separately, it might be simpler to treat the lines as separate production units, rather than combining them.

Finally, and most importantly, a collaborative approach to designating production units could be useful because a range of personnel might have relevant information. These include environmental managers, production supervisors, people doing equipment maintenance, process/product engineers, and fiscal managers.

Discussions with personnel from different disciplines will help inform your decisions on designating production units. This might also be of assistance in completing the final task associated with these designations -- assigning to the production units an output measure or measures for reporting and planning under TURA.

For some firms this will be as easy as keeping track of the number of products produced annually (e.g., a chair manufacturer could use the number of chairs).

For other firms, however, this might not be a simple issue and other measures of production levels should be used. Some examples are:

- Pounds of Plastic Resin Produced
- Square Yards of Paper Coated
- Gallons of Chemical Produced

Under TURA, such an output measure is called a "unit of product," and it serves the following functions.

Regulated firms report their progress in reducing byproducts and emissions on a per unit-of-product - basis. This approach to reporting is designed to "normalize" year-to-year changes in production levels that might increase or decrease chemical usage. [\[Endnote 3\]](#) With regard to planning, regulated firms will probably use the unit of product to evaluate the costs/benefits of alternative toxics use reduction techniques.

In choosing a unit of product, you should try to pick a measure of facility productivity that most closely reflects all activities involving the listed chemical. The measure must increase/decrease in a consistent way as chemical usage (or the generation of byproducts) increases or decreases.

In addition, the unit of product should be one that is as free from nonproduction influences as possible. Dollars sales, for example, are affected by a variety of factors that are unrelated to production levels or chemical usage: market share, pricing decisions, inflation, etc. Direct labor hours is another example of this.

Please note that the regulations previously required that the unit of product be a physical measure, disallowing the use of dollar sales or direct labors hours, for example.

After discussions with our Advisory Committee, MassDEP amended its regulations to allow firms to use nonphysical measures if developing a physical measure is not feasible.

If you chose a non-physical unit of product, however, you must explain in a letter why a physical measure cannot be used and you must state how the non-physical measure has been adjusted to accurately reflect production levels rather than changes in costs, prices, inventory, productivity or other factors.

For example, a repair facility handles so many different kinds of products that designating a single physical measure (e.g., number of pieces repaired) would be inaccurate. The firm might choose to use direct labor hours, but it would have to develop a mechanism for correcting for changes in worker productivity per type of product.

The following example illustrates some of the considerations involved in picking a unit of product.

EXAMPLE: A copper forming firm produces extruded copper products. Some of the alternative UNITS OF PRODUCT for this firm include:

- Number of finished products manufactured
- Surface area of copper processed
- Mass of copper produced

The firm rejects the first two measures for the following reasons.

Number of products produced fails to account for the wide range of sizes and shapes of the extruded products, which affect the amount of chemicals used.

Information on the **Surface area** of copper processed was not available and would be very difficult to collect.

Mass of copper produced was chosen as the UNIT OF PRODUCT because the firm's production records are expressed in those terms and the mass of copper processed through the plant is directly related to the amount of byproduct/emissions generated.

Up to this point in the discussion, the GUIDELINES have focused on presenting a framework for the decisions you will be making concerning production units. In the next and final section, the GUIDELINES will provide examples of how the choices you make relate to certain aspects of TURA reporting.

Production Unit(s) & TURA Reporting

Some of the information called for in the Annual Toxics Use Reports involves facility-wide usage of TURA related chemicals. These GUIDELINES, however, focus on the reporting requirements related specifically to production units. In this report, regulated firms identify the production unit(s) in which a TURA-regulated chemical is manufactured, processed, or otherwise used.

For each production unit, chemical usage is then reported in terms of a range, and indices are calculated to report progress in reducing byproducts and emissions, attributable to that production unit. Finally, the methods of achieving those reductions have to be indicated in a matrix form.

The choices made in designating production units can affect your reporting under TURA, as the tables below illustrate. Note that these tables focus on *one* aspect of TURA reporting -- calculating the byproduct reduction index ("BRI"). Note that the BRI is not necessarily the most important aspect of TURA reporting, and that reporting is not necessarily the most important aspect of TURA.

The examples based on BRI calculations do, however, illustrate the principles set out in these GUIDELINES.

The formula for the byproduct reduction index is: $100 \times ((A - B)/A)$

WHERE:

A = the quantity of toxic byproducts generated in base year divided by the units of product produced in base year

B = the quantity of toxic byproducts generated in reporting year divided by the units of product produced in reporting year

The following examples illustrates a BRI calculation:

A widget manufacturer's production unit generates a TURA-regulated chemical (nitrobenzene) as a byproduct. In the base year, (1987), 30,000 lbs. of nitrobenzene byproduct is generated for

180,000 widgets produced. In the reporting year, 1990, 48,000 lbs. of nitrobenzene byproduct is generated for 360,000 widgets produced.

$$A = 30,000 \text{ lbs. nitrobenzene} / 180,000 \text{ widgets} = 0.166$$

$$B = 48,000 \text{ lbs. nitrobenzene} / 360,000 \text{ widgets} = 0.133$$

$$\text{Byproduct reduction index} = 100 \times ((0.166 - 0.133) / 0.166) = 100 \times 0.198 \text{ or } 20$$

The BRI of 20 indicates that the widget manufacturer has reduced the nitrobenzene byproduct per widget by 20%. An index of 100 would represent the highest possible reduction, which means that the chemical was totally eliminated from the production unit. [Endnote 4]

This example takes the firm's designation of the production unit as a given. The examples depicted in the following tables illustrate the impact of the following:

TABLE #1: Decisions Concerning Products

TABLE #2: Decisions Concerning Units of Product

By giving these examples, MassDEP intends to illustrate the principles discussed previously in the GUIDELINES. The examples are based on discussions with industry, environmentalists and other government officials. The facts in these examples have been simplified.

TABLE #1: DECISIONS CONCERNING PRODUCTS

Assumptions: A paper maker produces assorted colors of paper, of which TURA-regulated chemical A is produced as a byproduct from the production of dark blue and light blue papers.

In 1990 (the base year) and 1991 (the reporting year) production remained the same at 10,000 lbs. (5,000 lbs. of dark blue and 5,000 lbs. of light blue).

1990 BYPRODUCTS 1991 BYPRODUCTS Dark Blue 100 lbs 80 lbs Light Blue 30 lbs 30 lbs TABLE #1: Decisions Concerning Products

TABLE #2: Decisions Concerning Units of Product

By giving these examples, MassDEP intends to illustrate the principles discussed previously in the **GUIDELINES**. The examples are based on discussions with industry, environmentalists and other government officials. The facts in these examples have been simplified.

TABLE #1: DECISIONS CONCERNING PRODUCTS

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As the information above indicates, this firm reduced the byproduct from the production of dark blue paper from 100 lbs. in 1990 to 80 lbs. in 1991.

Approaches to Grouping Products

Option #1:

A = 100 lbs. of chemical A/5,000 lbs of paper = 0.020

B = 80 lbs. of chemical A/5,000 lbs of paper = 0.016

BRI = $100 \times ((0.020 - 0.016)/0.020) = 100 \times 0.2 = 20$

Option #2:

A = 130 lbs. of chemical A/10,000 lbs of paper = 0.013

B = 110 lbs. of chemical A/10,000 lbs of paper = 0.011

BRI = $100 \times ((0.013 - 0.011)/0.013) = 100 \times 0.153 = 15$

SUMMARY: The BRI for dark blue paper as a separate product is 20, expressing a 20% reduction in the byproducts. The BRI for dark and light blue papers was 15. Combining the papers means that the byproduct reductions were averaged over all of them.

TABLE #2: DECISIONS CONCERNING UNITS OF PRODUCT

Assumptions: An electronics component manufacturer makes printed circuit boards. To clean the boards, the firm produces deionized water. TURA-regulated chemical C is a byproduct of the deionization unit.

In 1990 (the base year), the firm produced 9500 circuit boards. In 1991 (the reporting year), 7500 boards were produced. The amount of deionized water produced remained the same at 10,000 gallons/year. The firm reduced the byproducts from the deionization unit as shown below.

1990 BYPRODUCTS 100 lbs

1991 BYPRODUCTS 90 lbs

Approaches to Selecting a Unit of Product

Option #1:

The firm chooses gallons of deionized water as the unit of product for the deionization unit. (See p. 7 on treating this water as an intermediate product.)

Option #2:

The firm chooses number of printed circuit boards as the unit of product.

Byproduct Reduction Indices for the 2 OPTIONS.

Option #1: $A = 100 \text{ lbs. of chemical C} / 10,000 \text{ gals of water} = 0.010$

$B = 90 \text{ lbs. of chemical C} / 10,000 \text{ gals of water} = 0.009$

$BRI = 100 \times ((0.010 - 0.009) / 0.010) = 100 \times 0.1 = \mathbf{10}$

Option #2: $A = 100 \text{ lbs. of chemical C} / 9,500 \text{ boards} = 0.011$

$B = 90 \text{ lbs. of chemical C} / 7,500 \text{ boards} = 0.012$

$BRI = 100 \times ((0.011 - 0.012) / 0.011) = 100 \times -0.09 = \mathbf{-9}$

CONCLUSION: The BRI for the deionization unit as a separate production unit with gallons of water produced as the unit of product is 10, expressing a 10% reduction in the byproducts. The BRI for deionization unit, treated as part of the other manufacturing processes (with # of circuit boards as the unit of product) was a negative 9, suggesting a 9% increase in byproducts.

Endnotes

1. In the first TURA reporting year, the Act regulates the same chemicals that are regulated under Section 313 of the federal Emergency Planning and Community Right to Know Act (EPCRA), which requires toxic chemical release inventory reporting on a "FORM R." Over time, however, the list of TURA-regulated chemicals will be expanded to include the chemicals regulated under CERCLA (the federal Comprehensive Environmental Response, Compensation, and Liability Act).
2. Certain processes and activities are exempt from production unit reporting. These include pilot plants and waste treatment units. An exempt processes should not be considered a production unit or part of one. See the Instructions for Completing the Toxics Use Report for more detail.
3. This reporting method also allows firms to keep certain information on production levels confidential.
4. The formula for the emissions reduction index is the same as the BRI formula, except that the quantity of emissions generated appears in the numerator of the two ratios, A and B.

Appendix K: Glossary of Terms

Alloy: a substance possessing metallic properties and composed of two or more elements of which at least one must be a metal. The term refers to those cases where there is an intentional addition to a metal for the purpose of improving certain properties.


Byproduct: Non-product outputs of toxic or hazardous substances generated by a production unit, before handling, transfer, treatment or release. Otherwise used substances shall be counted as byproduct when they leave a production unit.

CERCLA: Comprehensive Environmental Response, Compensation, and Liability Act, commonly referred to as “Superfund.”

EPCRA: Emergency Planning and Community Right to Know Act.

Facility: all buildings, equipment, structures, and other stationary items which are located on a single site or on contiguous or adjacent sites and which are owned or operated by the same person, or by any person who controls, is controlled by, or is under common control with such person.

Full-Time Employee Equivalent: An FTE is defined as 2,000 work hours per year. The 10 FTE criteria is met if a total of 20,000 hours were worked by all employees (including consultants) whether they worked full or part-time.

 **Note:** repackaging the chemical is considered processing.

Higher Hazard Substance: means a substance designated by the Council as a higher hazard substance pursuant to M.G.L. c. 21I, § 9 and 301 CMR 41.00.

Included NAICS/SIC Codes: This is one of the areas where TURA’s requirements differ from those of EPCRA.

Under TURA, the NAICS/SIC code criteria are met if any of the business activities are conducted in the areas represented by TURA’s longer list of included NAICS/SIC codes. The TURA list includes manufacturing plus business activities such as transportation, wholesale trade, and business or personal services.

EPCRA reporting is only required of firms that derive more than 50% of their business from **manufacturing**. For the descriptions of the NAICS/SIC codes, see Appendix A.

Lower Hazard Substance: means a substance designated by the Council as a lower hazard substance pursuant to M.G.L. c. 21I, § 9 and 301 CMR 41.00.

Manufacture: to produce, prepare, import or compound a toxic or hazardous substance. Manufacture shall also mean to produce a toxic or hazardous substance coincidentally during the manufacture, processing, use, or disposal of another substance that is separated from that other substance or mixture of substances as a byproduct, and a toxic substance that remains in that other substance or mixture of substances as an impurity.

Otherwise Use: EPA has revised its definition of OTHERWISE USE to mean ‘any use of a toxic chemical, including a toxic chemical contained in a mixture or other trade name product or waste, that is not covered in the terms “manufacture” or “process.” Otherwise Use of a toxic chemical does not include disposal, stabilization (without subsequent distribution in commerce), or treatment for destruction unless:

- ❑ The toxic chemical that was disposed, stabilized, or treated for destruction was received from off-site for the purposes of further waste management; or
- ❑ The toxic chemical that was disposed, stabilized, or treated for destruction was manufactured as a result of waste management activities on materials received from off-site for the purposes of further waste management activities. Relabeling or redistributing of the toxic chemical where no repackaging of the toxic chemical occurs does not constitute otherwise use or processing the toxic chemical.

Process: the preparation of a toxic or hazardous substance, including, without limitation, a toxic substance contained in a mixture or trade name product, after its manufacture, for distribution in commerce:

- ❑ In the same form or physical state, or in a different form or physical state from that in which it was received by the toxics user preparing such substance; or
- ❑ As part of an article containing the toxic or hazardous substance.

Product: a product, a family of products, an intermediate product, family of intermediate products, or a desired result or a family of results. “Product” also means a byproduct that is used as a raw material without treatment.

Sanitized vs. Unsanitized Reports: If you make a Trade Secret claim, you must submit two versions of your report -- one that contains the Trade Secret information (**unsanitized**) and one that does not (**sanitized**). In Item g. in Section 1 of the Form S Cover Sheet, indicate whether the version of the report is sanitized or unsanitized.

Shipped in or as Product: the quantity of the chemical that leaves the facility as product.