Drinking water disinfection by-products (DBPs) are an unintended consequence of using chemical disinfectants to kill harmful pathogens in water. DBPs are formed by the reaction of disinfectants with naturally occurring organic matter, bromide, and iodide, as well as from anthropogenic pollutants, such as pharmaceuticals and pesticides. Potential health risks of DBPs from drinking water include bladder cancer, early-term miscarriage, and birth defects. Risks from swimming pool DBP exposures include asthma and other respiratory effects. Several DBPs, such as trihalomethanes (THMs), haloacetic acids (HAAs), bromide, and chlorite, are regulated in the U.S. and in other countries, but other “emerging” DBPs, such as iodo-acids, halobenzoquinones, halonitromethanes, halomamines, halofuranones, and nitrosamines are not widely regulated. DBPs have been reported for the four major disinfectants: chlorine, chloramines, ozone, and chlorine dioxide (and their combinations), as well as for newer disinfectants, such as UV treatment with post-chlorination. Each disinfectant can produce its own suite of by-products. Several classes of emerging DBPs are increased in formation with the use of alternative disinfectants (e.g., chloramines), including nitrogen-containing DBPs (“N-DBPs”), which are generally more genotoxic and cytotoxic than those without nitrogen. Analytical methods continue to be developed to measure target DBPs, and research continues to uncover new DBPs that are part of the missing fraction of DBPs not yet accounted for. This presentation will provide a state-of-the-science overview of the formation of DBPs from different disinfectants, along with mechanisms of formation when known, as well as new links to human epidemiology resulting from the new HiWATE Study conducted in Europe.