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Excerpt from McCoy's CAA Unraveled, First Edition

1.3 Taking a pollutant approach to the CAA

In addition to understanding the various CAA regulatory programs, it is important to understand how a single pollutant may be regulated in several ways. Pollutants are regulated under the CAA for a variety of reasons, including physical form, chemical composition, atmospheric reactivity, toxicity, etc. Understanding how air pollutants are regulated provides a fundamental advantage when complying with state and federal regulations, because it helps you understand where and how various CAA programs overlap and interact. Moreover, this approach will assist you in conducting effective audits, tackling complex regulations, and avoiding compliance issues.

For example, consider a major source metal finishing plant that installs a new chromium electroplating tank to meet customer demands. The pollutant, chromic acid mist, is regulated as a HAP (i.e., chromium compounds) under the air toxics pro-

gram. Thus, the chromium electroplating MACT standard in Part 63, Subpart N regulates the chromium concentration in exhaust gases ventilated to atmosphere. At this point, it would be easy for the facility to assume that the new tank is not subject to any other regulation. However, under many state SIPs, chromic acid mist meets the definition of PM and is regulated as such. In Virginia, PM is defined to mean "any airborne finely divided solid or liquid material with an aerodynamic diameter smaller than 100 micrometers." [VA SAPCB 9 VAC 5-10-20] Effectively, this means that emissions from a chromium electroplating tank in Virginia are subject to both SIP and MACT requirements. Furthermore, both an NSR preconstruction permit and a Title V operating permit are required. Thus, the plant is subject to requirements under several CAA programs, and failure to recognize this could inadvertently lead to multiple violations.

In order to make it easier to determine the relationships between pollutants, we have put together a pollutant regulation matrix in Table 1-8.

Table 1-8: Pollutant Regulation Matrix

Pollutant	CO	Lead	NO ₂	Ozone	PM	SO _x	VOCs	NO _x	SO ₂	VHAPs	Metal HAPs	Other HAPs	ODS
CO	■												
Lead		■			■						■		
NO ₂			■		■			■					
Ozone				■			■	■					
PM		■	■		■	■	■	■	■	■	■	■	■
SO _x					■	■			■				
VOCs				■	■		■			■			■
NO _x			■	■	■			■					
SO ₂					■	■			■				
VHAPs					■		■			■			■
Metal HAPs		■			■						■		
Other HAPs					■							■	■
ODS					■		■			■		■	■

CO = carbon monoxide, HAPs = hazardous air pollutants, NO₂ = nitrogen dioxide, NO_x = nitrogen oxides, ODS = ozone-depleting substances, PM = particulate matter, SO₂ = sulfur dioxide, SO_x = sulfur oxides, VOCs = volatile organic compounds, VHAPs = volatile hazardous air pollutants.

Source: McCoy and Associates, Inc.

The matrix has the same list of pollutants (i.e., criteria pollutants and precursors, acid rain pollutants, and HAPs) running both across and down. If you read across a row for one pollutant, you can see whether the pollutant may also be regulated as another pollutant. So, for example, CO emissions are regulated only as CO, but VOC emissions may be regulated as VOCs, ozone precursors, PM, or VHAPs, and a few VOCs are also ODS. Some notable relationships are highlighted below:

- Ozone is a criteria pollutant that is formed through the photochemical reaction of CO, VOCs, and NO_x . VOCs and NO_x are regulated as ozone precursors, but CO is not because it is already regulated directly as a criteria pollutant. Although some states publish a list of regulated VOCs, EPA does not maintain a comprehensive list. Rather, EPA maintains a list of organic compounds that do not meet the definition of VOC at §51.100(s)(1). The chemicals exempt from VOC status have “negligible photochemical reactivity” according to EPA. For example, methylene chloride is exempt from the definition of VOC but is regulated as a HAP due to its toxicity.
 - Most regulated air pollutants are defined by their chemical characteristics, but PM is defined by its physical characteristics. PM has so much overlap with other pollutants that every other pollutant in Table 1-8 may be subject to regulation as PM, except CO and ozone. So, why is this? Commonly, people think of PM as solid particles, such as metal shavings, dust, lime, ash, etc. However, as the chromium electroplating example illustrates, PM can also be an aerosol, mist, or even a vapor since it is generally defined based on particle size.
 - Lead is regulated directly as both a criteria pollutant and a HAP under the CAA. In addition, lead may be regulated as PM.
 - The CAA regulates 187 HAPs, as shown in Table 4-1. The list of HAPs contains both organic and inorganic chemicals and chemical compounds. The list also contains radioactive compounds.
- Most of the organic compounds on the list are volatile, and these are commonly referred to as volatile HAPs (VHAPs). The inorganic HAPs are mostly metal compounds, and this leaves only a few organic and inorganic HAPs that do not fit into either of these categories.
- Many VHAPs are also regulated as VOCs under state/local SIPs, PSD/NSR permitting, and the NSPS program. In addition, they may contribute to PM levels. Although this may seem complicated, the rationale is simple. Many of these pollutants are toxic, photochemically reactive, and meet the definition of PM. Thus, the nature of the pollutant gives rise to how the CAA regulates it.
 - ODS are often overlooked when it comes to CAA compliance. A common mistake is to assume the ODS lists in Part 82, Subpart A, Appendices A and B contain only refrigerants. Although it is true that the majority of ODS are largely used as refrigerants, a few non-refrigerants are also on the list (e.g., carbon tetrachloride; 1,1,1-trichloroethane; and methyl bromide). All three of these chemicals may be used in or formed by various processes in chemical manufacturing, metal finishing, pharmaceutical production, research and development, and agricultural applications. Although some exemptions are applicable to ODS, these exemptions are typically very narrow. Without such an exemption, use or formation of an ODS in a process may inadvertently trigger Part 82 notifications, product labeling, and disposal requirements.
- We recommend that you consider both the applicable regulatory programs and air pollutants produced when evaluating CAA compliance. By entertaining both of these perspectives, the likelihood of missing a potentially applicable requirement is significantly reduced. If your facility is required to submit an annual air emission inventory, a toxics release inventory under the Emergency Planning and Community Right-to-Know Act (EPCRA), or a biennial report under the Resource Conservation and Recovery Act (RCRA), those documents can

serve as a starting point to ensure proper accounting of all emissions under the CAA.

When looking at individual pollutants, two good starting points for identifying potentially applicable CAA provisions are EPA's *List of Lists*, EPA/550/B-01/003 (available from <http://www.epa.gov/ceppo/pubs/title3.pdf>) and the National Library of Medicine's hazardous substance data bank (HSDB) at <http://toxnet.nlm.nih.gov/cgi-bin/sis/htmlgen?HSDB>. EPA's *List of Lists* is a consolidated

list of chemicals subject to multiple environmental regulations and provides cross-referencing by synonym and Chemical Abstracts Service Registry Number. The HSDB provides a wealth of information on chemicals, including a regulatory section on potentially applicable atmospheric standards. The only caveat is that how a chemical is emitted and its source are both important factors in determining the applicability of CAA regs, so consider this a first step, not the last.