HOW TO MEASURE STYRENE ON A CIPP JOBSITE

By NASSCO Member Dennis Pivin, CSP
VP Environmental, Health, Safety and Security at Aegion Corporation

There has been a lot of misinformation and questions recently regarding CIPP job sites and testing for styrene. This article will strive to help CIPP companies better understand the use of the Photo-Ionization Detector (PID) when sampling job sites.

First, we need to conduct a hazard assessment and determine what data need to be collected, what methods are best suited for gathering this data, and what will the employer do with this data once completed. Unfortunately, in many cases the employer may not fully understand how to conduct the hazard assessment and may use incorrect methods to gather data. For example, is the employer looking to collect data for environmental release concerns or is the focus to assess the job site to understand potential worker exposures?

While there are a variety of sampling devices (Photo-Ionization Devices, Organic Vapor Monitors, Waterloo Sampler, and Colorimetric tubes (Drager tubes)) this NASSCO Tech Tip focuses on the PID.

The PID is designed to use a broad-band sensor that measures a wide variety of Volatile Organic Compounds (VOCs) in very low concentrations of 0.1 to 2000 ppm. The PID operates by using a pump that pulls air across an ultra-violet lamp. This lamp ionizes the particles as they pass across it, resulting in the charged ions moving toward plates in the sensor, and current is produced. The current is then measured, and a concentration in ppm is displayed on the meter.

What does the PID measure? Before starting to use a PID, the user should keep in mind that according to manufacturer's specifications, a PID should be calibrated prior to its use. Always refer to the user's manual on proper calibration gases and the proper technique to conduct the instrument calibration. The PID can successfully measure a carbon containing volatile organic compounds. **Some of these compounds include, but are not limited to, the following:**

CATEGORY	CHEMICAL
Aromatics	Benzene, Ethyl Benzene, Toluene, Xylene, Styrene
Ketones Aldehydes	Acetone, Methyl Ethyl Ketone
Amines	Diethyl Amine, Triethyl Amine
Chlorinated Hydrocarbons	Trichlorethylene
Alcohols	Ethanol, Methanol, Butyl Alcohol

So, now that we have identified how the PID functions and what it can measure and detect, the user should keep the following concept in mind. A PID is very sensitive to VOCs but it is not selective. It will provide a concentration reading in ppm but may be detecting one or more VOCs and it cannot tell the user exactly what compound (or compounds) are being measured.

Therefore, the user of the PID needs to have a background in what chemical is being monitored and whether that chemical has any other characteristics that help identify it. For example, if we are using a PID to detect styrene, the user can count on the low odor threshold to indicate styrene's presence while the PID provides a concentration reading in ppm.

WHAT A PID CANNOT DO (selectivity vs. sensitivity)

- PID is very sensitive and accurate
- PID is not very selective

A ruler cannot tell the difference between yellow and white paper

In addition, when using a PID, the ppm reading on the display may not be the concentration of just one chemical. There are chemicals that have a mixture of other chemicals in smaller concentrations. Thus, the user should look into correction factors to accommodate for those chemicals and improve the accuracy of the ppm reading.

One issue that seems to challenge companies in the CIPP industry is using four gas sensing instruments to determine styrene concentrations. Specifically, the LEL sensor is not designed to measure the concentration of styrene—it is designed to measure the flammability range. Therefore, using the PID is the correct instrument, not the four-gas air monitor.

Are PIDs sensitive to moisture? Yes, the sensor inside the instrument is very sensitive to moisture and will potentially provide inaccurate readings before ultimately shutting down. All PIDs should have a moisture filter that will prevent moisture from getting into the sensor. Keep in mind that environments that have high moisture content (sewers and steam exhaust stacks) may overwhelm the filter and cause erroneous readings and a failed instrument.

In summary, the PID is an excellent instrument to use on CIPP job sites when the user understands its functions, calibration, and sensitivity. In addition, it can provide an accurate reading of styrene concentration on the job site as well as at manufacturing operations.

A future NASSCO Tech Tip will focus on other sampling devices. To learn more about CIPP and styrene safety please visit nassco.org/styrene-safety.