

Total Non-Methane Hydrocarbon Monitoring Results Technical Memorandum
Comments by the Independent Odor Expert – Dirk Apgar
August 2010

Introduction

This paper is intended to provide a constructive critique of the City of Los Angeles' (City) Total Non-Methane Hydrocarbon (TNMHC) Monitoring Results Technical Memorandum (Technical Memorandum). Monitoring of TNMHC was conducted by the City as part of the ongoing Air Treatment Facility Evaluation Study. Monitoring of hydrocarbons as well as odorous compounds was also conducted as part of this work.

The City is required under the terms of the Collection System Settlement Agreement to install and operate interim and permanent air treatment facilities (ATFs) for the control of odors. These ATFs must have permits issued by the South Coast Air Quality Management District (SCAQMD) that will allow the City to build and operate the facilities. Permits of this type place limits on ATF pollutant emissions that could have nuisance or human health effects.

Some organic¹ pollutants that may be emitted from the ATFs can react in the atmosphere forming ozone (O₃) which is one of the first pollutants regulated under the Clean Air Act. The concentration of O₃ in the City's air is higher than the regulatory limit. As a result, the City is considered a non-attainment area for that pollutant by the United States Environmental Protection Agency (US EPA). The SCAQMD limits emissions of these pollutants as a way to limit the production of O₃. The existing interim ATFs are required to meet SCAQMD TNMHC and hydrogen sulfide (H₂S) emission concentration limits described in their permits. Future ATFs will certainly have limits on these pollutants as well.

As part of the City's ATF Evaluation Study (intended to determine the number and location of the new ATFs for odor control), the City wanted to gain knowledge about the pollutants in the sewer air that the new ATFs would be treating and about the ability of the interim ATFs to control these pollutants. This would allow the City to determine if the interim ATF technology (carbon bed scrubbers) could be used as part of the new ATF systems. The purpose of the work described in the Technical Memorandum was the following:

- Understand the characteristics of the air pollutants in the sewer air that would be treated by the new ATFs;
- Determine if the concentrations of the various organic compounds in the sewer air summed to a similar value as that determined by the SCAQMD TNMHC testing method;
- Determine if there were organic compounds in the sewer air that should not be included in the calculation of the TNMHC concentration;
- Compare the measured pollutant concentrations in the interim ATF exhaust against the SCAQMD permit limits;
- Assess the pollutant removal efficiency of the interim ATFs; and
- Determine if a handheld device could be used to measure TNMHC concentrations

¹ Substance whose molecules contain one or more carbon atoms with the exception of carbonates, cyanides, carbides, and a few others.

Pollutants in Sewer Air

Sampling and Analysis of Sewer Air Pollutants

The City simultaneously extracted air samples for several analytical laboratory methods. Two EPA methods, TO-12 and TO-15, were used to determine the concentration of specific organic compounds, SCAQMD Method 25.3 was used to quantify TNMHC concentration and American Society for Testing and Materials (ASTM) Method D5504 was used to quantify sulfur compound concentrations in the sewer air. In addition to these methods, H₂S data monitors were used to spot check and collect concentration data over extended periods. A handheld photo-ionization detector (PID) was also used with hopes that it could be used as an alternative to Method 25.3 for measuring TNMHC concentrations.

Pollutants in the Air Stream

The two EPA methods yielded a great deal of information about which organic compounds are present in the sewer air that made up the interim ATF inlet air streams and in the interim ATF exhausts. The information about the individual compounds is valuable in that it could be used in the evaluation of future ATF technologies for controlling their emission into the atmosphere at concentrations acceptable to the SCAQMD. The pollutants identified by these methods probably contribute only slightly to the total sewer odor given the concentrations reported. The sulfurous compounds identified by the ASTM method are likely the main cause of sewer odors in these air streams.

The City was interested if the EPA methods would find some compounds that do not cause O₃ production in the atmosphere, but could influence the TNMHC value determined by the SCAQMD method. If the EPA methods *did* find such compounds, that could call into question the permit limit on TNMHC concentration that SCAQMD uses to limit atmospheric O₃ levels. Ultimately, discounting the influence of those non- O₃ producing compounds did not appreciably change TNMHC concentration, so the SCAQMD method appears to be a reasonable way of finding the concentration.

Using the information obtained by the EPA methods, the total carbon in the organic compounds was summed and compared to the TNMHC value obtained by the SCAQMD Method 25.3. The values determined by the two methods differed by as much as a factor of five and were not consistent between sites. Examination of the Method 25.3, TO-12, and TO-15 did provide information on which compounds most influenced the TNMHC concentrations. This information could be used in the selection of ATF technology if it is deemed necessary to lower the concentration of those most influential compounds to meet the permit limits.

The interim ATFs were able to control the emission of H₂S and TNMHC to their individual permit limits at all locations with the exception of the Humboldt ATF. The concentration of TNMHC in the exhaust stream was measured at 18.4 parts per million as carbon (ppmC). This exceeded the permit limit of 18 ppmC. The Technical Memorandum states that the relatively high exhaust concentration was likely due to the fact that the carbon was spent, which means that it was past the end of its useful life. This is a reasonable conclusion since the other ATFs

sampled were able to adequately control the TNMHC emissions below the permit limits. Simply installing fresh carbon should allow the Humboldt ATF to meet the permit limit.

A handheld photo-ionization detector (PID) was used to sample the sewer air to determine if that type of device could be used to measure TNMHC concentrations rather than the more cumbersome SCAQMD method 25.3. The handheld PID would have the advantage of providing almost instantaneous values at the ATF locations, whereas the SCAQMD method requires that samples be taken to a laboratory for analysis and it can take weeks to obtain results. Unfortunately, the information from the two methods compared poorly so it is not likely that use of the PID will provide its desired advantage.

Conclusions

The City conducted a substantial effort and developed an understanding of the types and concentrations of pollutants that are treated by the interim ATFs that have been installed for odor control. Because the SCAQMD places permit limits on the emission of TNMHC and hydrogen sulfide, the City monitored the inlet and outlet airstreams of the existing interim ATFs. It was shown that these current systems, based on carbon bed scrubbers, can be effective in meeting the permit requirements.

The monitoring and analysis did show that there were some organic compounds that influence the TNMHC concentrations but do not contribute to O₃ production in the atmosphere, which is what the permit limit is intended to prevent. However, this influence was slight and will not likely change the requirement to limit the TNMHC emissions.

The interim ATFs were shown to be capable of removing pollutants with sufficient efficiency to meet their permit requirements. This is not to say that the currently installed interim ATFs have provided adequate relief from odor impacts on the community, but only that the permit conditions can be met. In one case the permit limit for TNMHC was exceeded and was likely due to the need for new carbon. In a similar manner, hydrogen sulfide and other odorous compounds can be emitted if the carbon in these devices is not changed with adequate frequency.

A handheld PID was tested as a simple means of determining TNMHC concentrations. However, it was found that the device compared poorly with the method required by the SCAQMD. It was rightly concluded that it was not likely an adequate tool for determining permit compliance.

The City was able to gain some useful information regarding the composition of the sewer air and the various testing methods for organic air pollutants and TNMHC concentrations that are available. It also verified that the interim ATF carbon bed scrubber technology was adequate for meeting its current permit limits. This technology could likely be used as part of the new ATF systems.