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CAMM Challenges and Experiences

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Overview

- CAMM Applications
- Challenges/Experiences
- Guidance Evolution
- Conclusions

CAMM Applications

- O. Reg. 419 Sarnia Initiative
- Technical Standard Development
- Site Specific Standard

O. Reg. 419 Sarnia Initiative

Launched in 2008

- Numerous petrochemical and chemical facilities in Sarnia-Lambton invited via Notices
- Required CAMM studies from all sites with fugitive-type sources of Contaminants of Interest
- Studies at various stages of completion

Technical Standard Development

Refining and Petrochemical Sectors

- **Initially utilizing ambient monitoring element to confirm significant sources of benzene and 1, 3-butadiene**
- **CAMM studies may be required to support the technical standard development**

Site Specific Standard Application

Required application element

- **Intended to involve sources with emission rates that are not well-understood**
- **Usually fugitive-type sources for which the MOE feels emissions are not well characterized**

Challenges

- Short sampling duration (1 hour)
- Tight wind vectors
- Location of monitors
- Hit criteria
- Receptor grid design
- Facility complexity

Sampling Duration

- Difficult to deploy simultaneously – timers not permitted for safety reasons
- 1 hour sample not really relevant for contaminants with 24 hour or annual limits
- Many samples were non-detect

Sampling Duration – New Guidance

Moved to 12-24 hour sampling duration

- Still required to deploy approximately simultaneously
- Provides better opportunity for “apples to apples” comparison to limits

Wind Criteria

Allowable wind vectors were very tight (+/- 20°) plus requirement for wind to hold direction/ minimum speed >50 / 75% of the hour

- Few sampling opportunities
- In some cases sampling was completed, but no analysis was done due to changing met conditions

Monitor Locations

Non-ideal

- **Structural influences, especially near the process units**
- **Due to facility complexity, many monitors influenced by multiple sources**
- **Upwind monitors often not truly upwind, but location was compromised in order to stay within facility boundary**

Process Unit

Technical Working Group (TWG) Statistical Review

Structural Influence - Monitor Locations

- **CAMM methodology can err by an order of magnitude**
- **Problem: Plans established prior to study not permitted to be updated**
- **Can't incorporate TWG recommendations**

Hit criteria

Downwind monitor must be >50% higher than upwind monitor

- Potential to skew results high
- Many upwind results higher than downwind

Receptor Grid Design

Receptors placed on monitor location plus 4 at N/S/E/W vectors with 10 m spacing

- Too limited, especially given uncertainty in wind direction over sampling period
- Modelled plume "missed" the receptors
- Guidance has been updated

Updated Guidance - Receptors

Updated grid design – must now be placed on a 10° arc across the monitor location

- TWG study recommended this approach
- Arc may better capture the plume

Challenge…requires creation of a new set of arc receptors for each location and sampling period to reflect wind direction

- Time consuming in model setup and data reduction

Facility Complexity

- Hundreds of sources
- Complex source characteristics
- Structures/Process Units challenging to model, AERMOD limited in accounting for impact of multiple structures
- Even when emission rate well defined, may never get agreement between monitor and model

Source Characteristic Sensitivities

- The closer the monitor is located to the source, the more influential source parameters become
- Fugitive sources (e.g. process units) typically modelled as volume or area sources
- Significant differences observed in the near field modeling result due to volume source setup - Single volume source vs series of volume sources

Modelling Fugitive Sources

Limited ability to accurately predict concentrations near fugitive sources

- Volume source predictions don't account for structural influences
- Emissions allocation across a series of volume sources is often simplified due limited data delineation

Adjustment of emission rates using CAMM methodologies will not improve these limitations

Emission rate adjustments would skew predictions at more distant receptors on the property line and beyond – which is **the regulatory compliance determinant**

Conclusions

The CAMM technical guidance has improved

CAMM may be useful for high level ground proofing of a model

CAMM may be more useful for less complex facilities needing assistance in identifying significant sources

Often not appropriate for prescriptive emission rate changes

Use of CAMM for process unit fugitives may not be appropriate

Time and effort could be better spent in establishing best practice standards for these types of sources