

# **TEX-CHM-12: Houston Ozone Monitoring Interferences**

**TERC-SAC TexAQS II Breakout Session  
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# Key Points

- **Ground-level UV O<sub>3</sub> monitors susceptible to 20-40 ppb positive interference bias under design value day conditions.**
- **In 2001-2003 94% of monitored US non-attainment counties exceeded the 8-hour O<sub>3</sub> standard by ≤ 15 ppb.**

# Lab Tested Interferences

## Positive Interferences

**styrene**

**t- $\beta$ -methyl styrene**

**2,5-dimethyl styrene**

**naphthalene**

**benzaldehyde**

**2-methyl phenol**

**2,4-dimethyl phenol**

**2-methyl 4-nitro phenol**

**2-nitro toluene**

**mercury vapor**

## Non-Interferences

**benzene**

**toluene**

**o,m,p-xylenes**

**1,2,4-trimethyl benzene**

**PAN**

**alkyl nitrates**

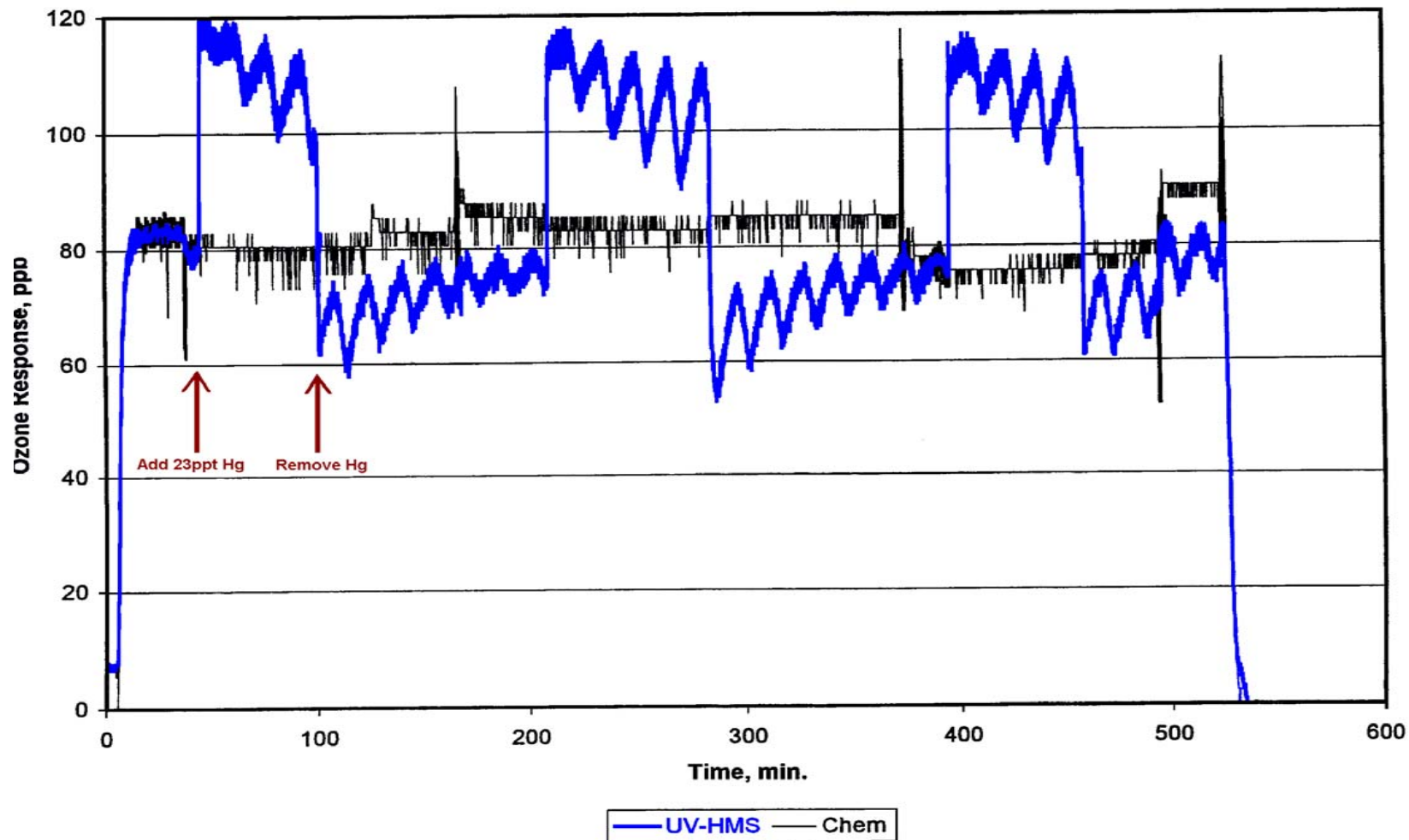
**methane thiol**

**methyl sulfide**

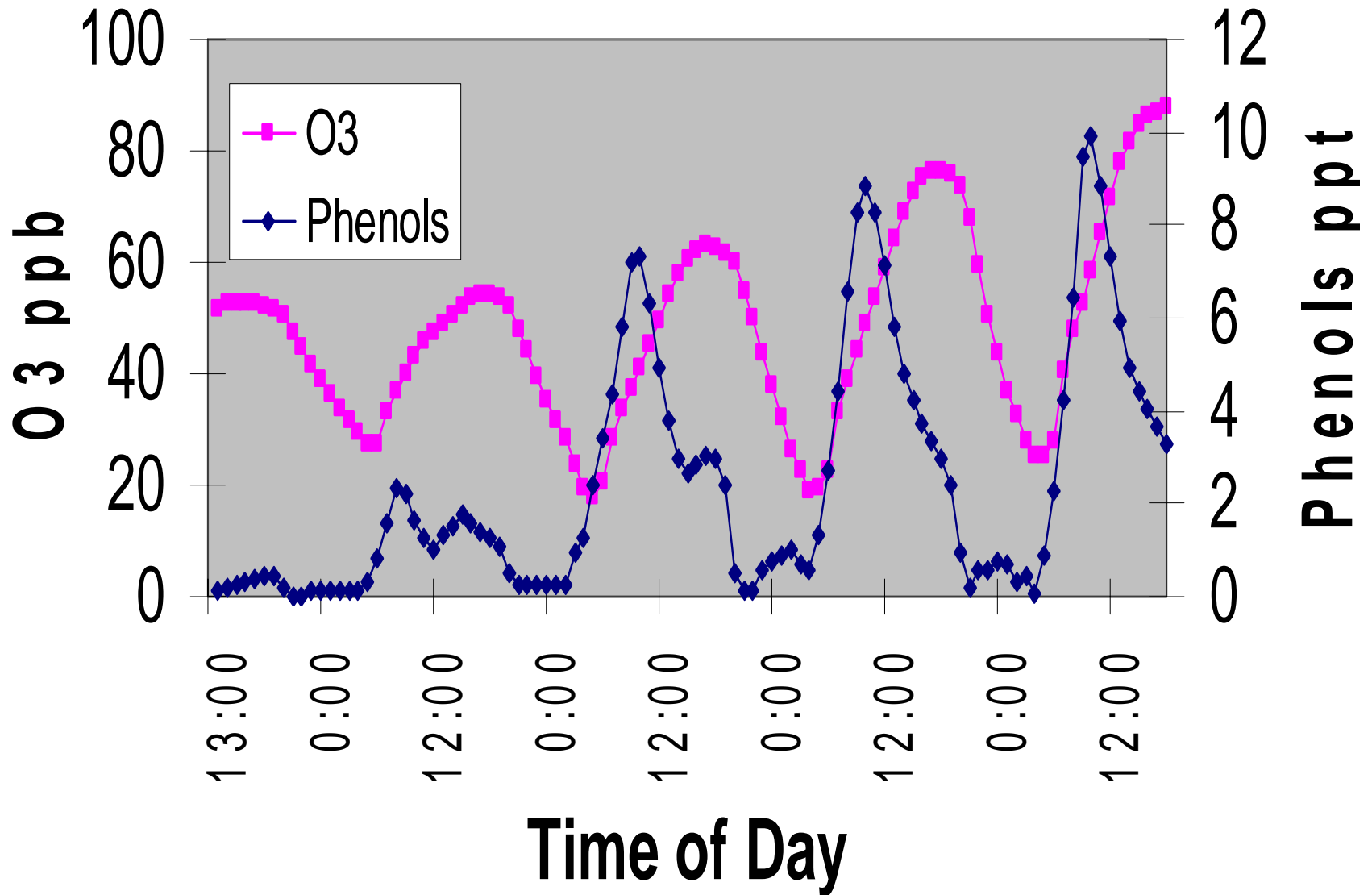
**ethyl sulfide**

# Mercury Vapor Interference

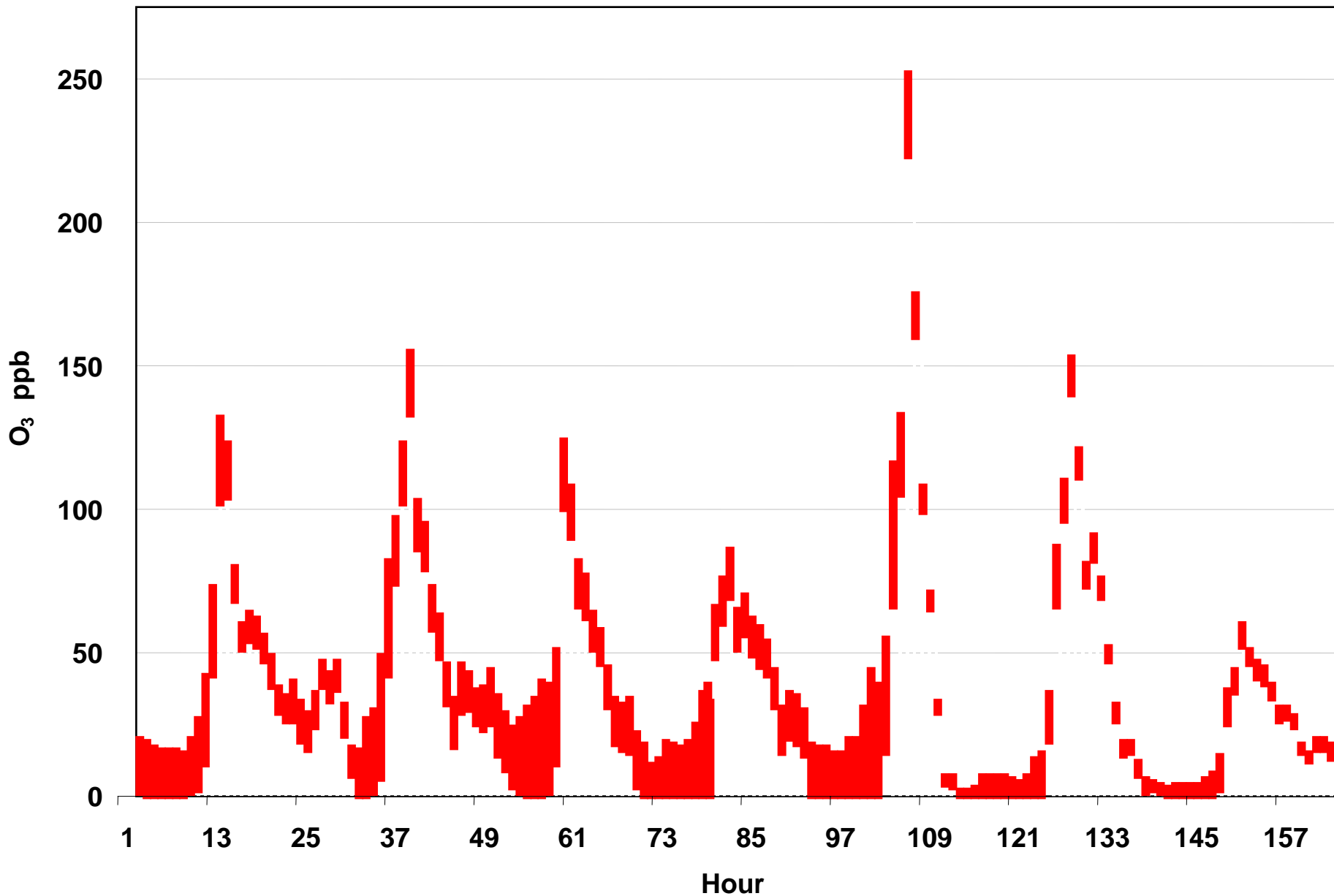
23 ppt Hg ~ 40 ppb O<sub>3</sub>



# Trajectory O<sub>3</sub> & C<sub>6-8</sub> Phenols



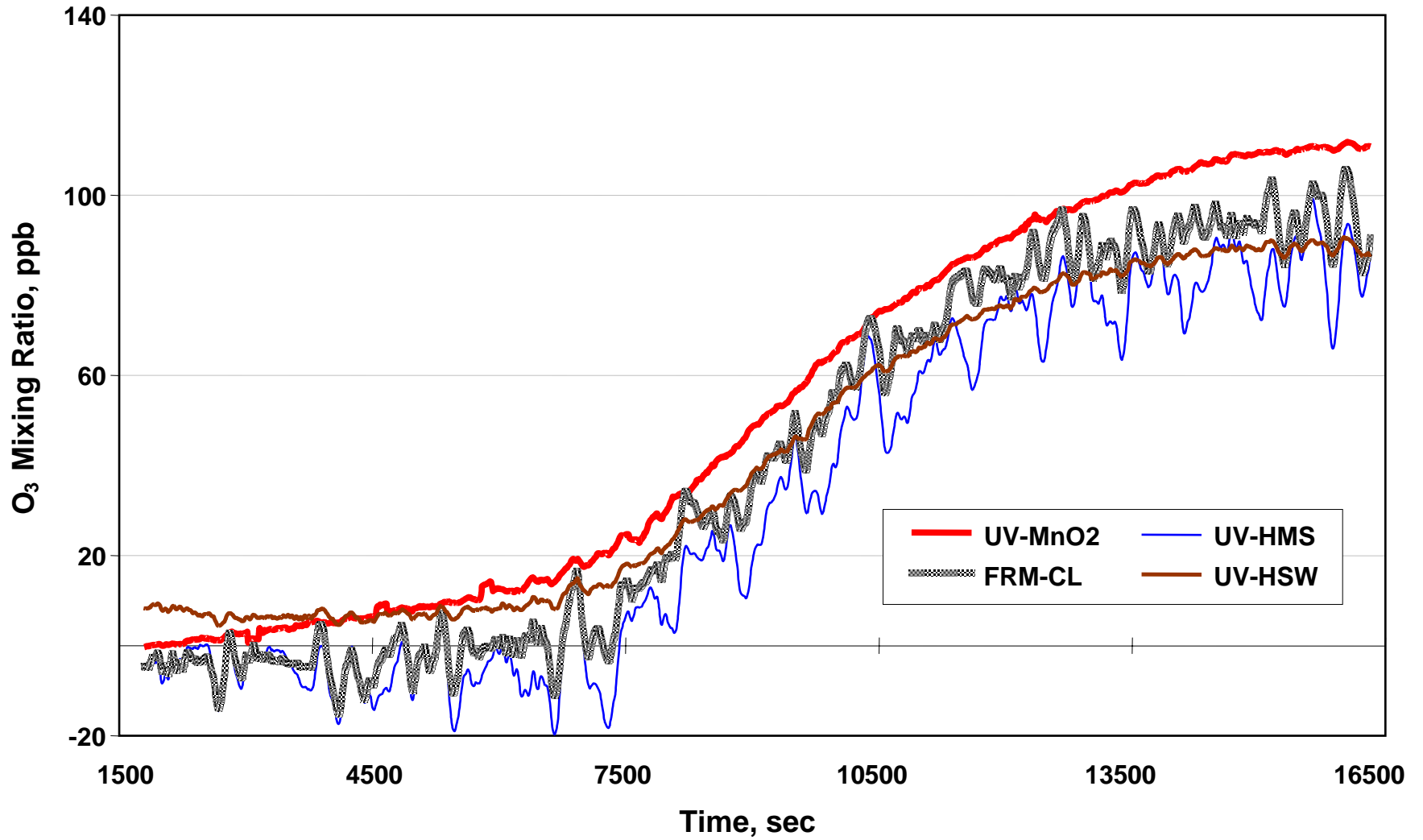
# O3 "Delta" (UV-CL) by Collocated FRM/FEM



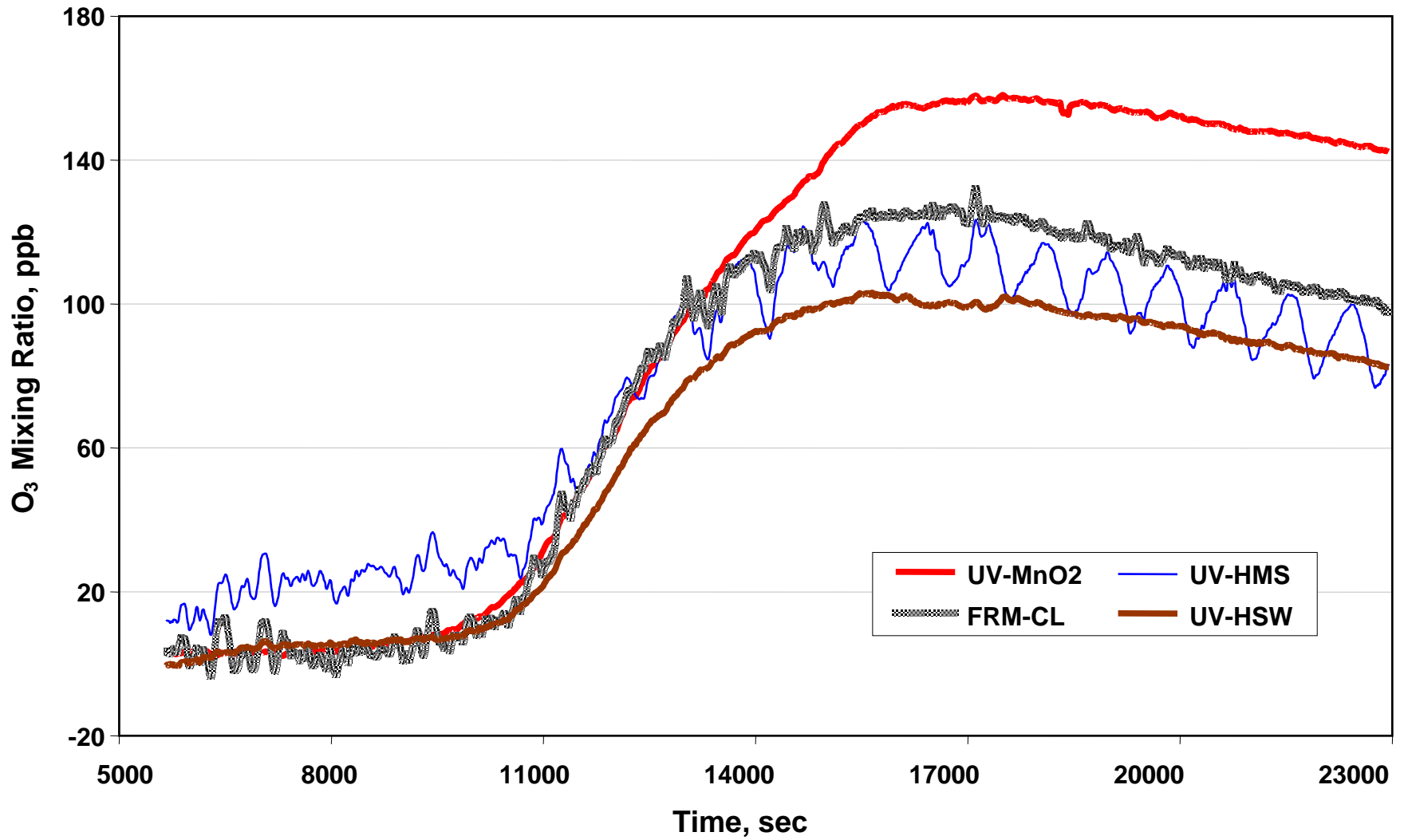
# Smog Chamber Comparisons

- Three 17.3 m<sup>3</sup> chamber runs at 24°C (77% RH) with 0.25 ppm NO<sub>x</sub> and 0.3-0.6 ppm (2.4-4.4 ppmC) VOC:
  - Toluene (0.36 ppm)
  - C<sub>8</sub> mix (o/p-xylene & ethylbenzene – 0.55 ppm)
  - 17 component urban mix (0.6 ppm)
- Four ozone monitors with a common inlet filter:
  - UV with MnO<sub>2</sub> scrubber
  - UV with heated silver wool scrubber
  - UV with heated metal scrubber
  - FRM-CL

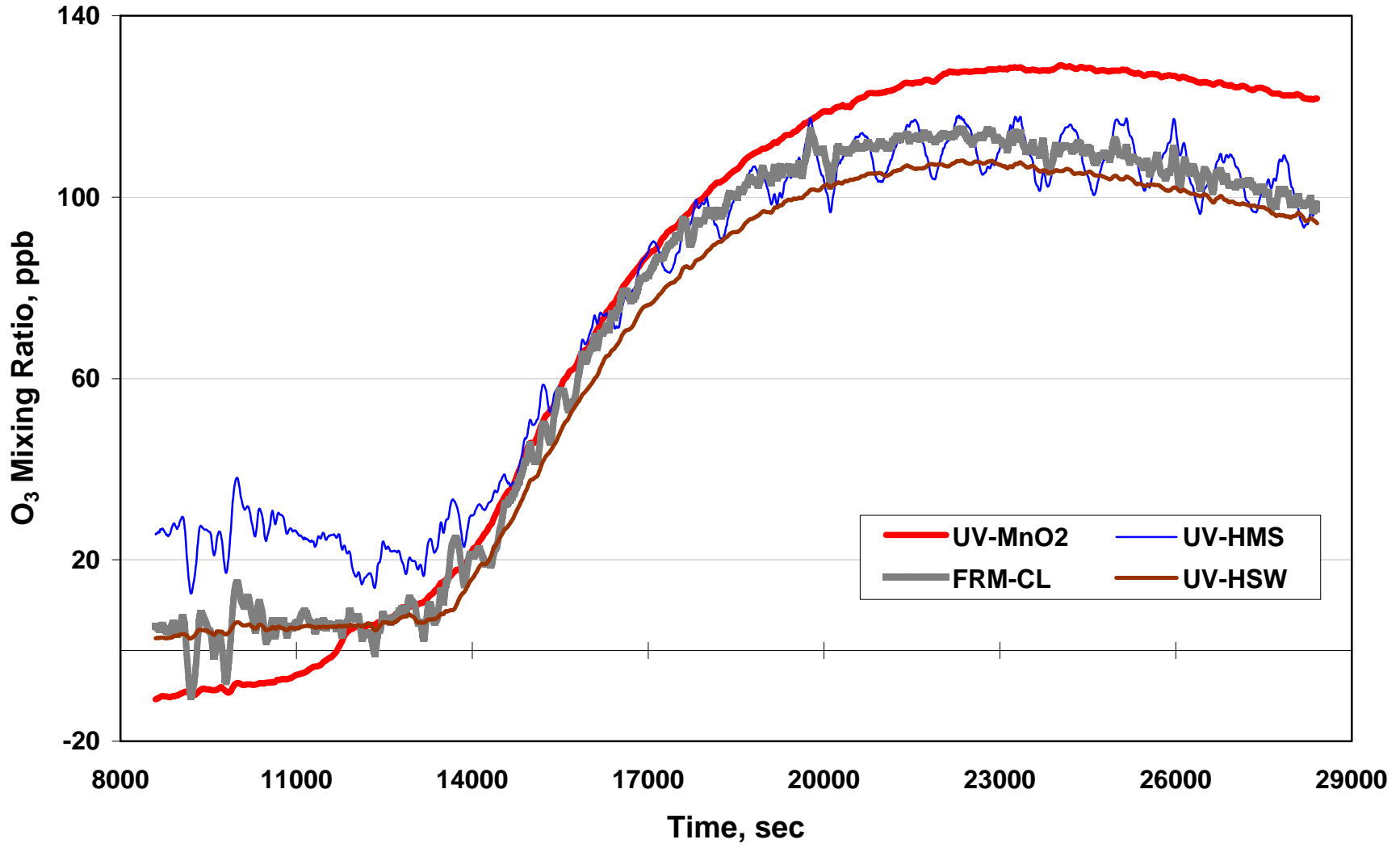
## Response of O<sub>3</sub> Monitors to NO<sub>x</sub>/Toluene Chamber Mixture



## Response of O<sub>3</sub> Monitors to NO<sub>x</sub>/C<sub>8</sub> Chamber Mixture



# Response of 4 O<sub>3</sub> Monitors to NO<sub>x</sub>/Urban Chamber Mixture



# Proposed Study

- 1. Deploy collocated O<sub>3</sub> monitors at UH tower and two or more Houston design value sites**
- 2. Site four types of collocated monitors UV-MnO<sub>2</sub>, UV-Ag, CL-ethylene, CL- NO per site**
- 3. Conduct collocated monitoring over a Houston smog season with TCEQ and instrument manufacturer cooperation**
- 4. Assess air quality & meteorological variables associated with monitor differences to explain and correct measurement bias**