

Benzene Fenceline Monitoring

Fast Fact

Real-time Benzene Analysis at $< 9.0 \mu\text{g}/\text{m}^3$ (2.8ppb), Fully Automated Fenceline Compliance

Recent amendments to 40 CFR 60 and 63 have lowered the actionable level for benzene at the refinery fenceline to $9.0 \mu\text{g}/\text{m}^3$ (2.8 ppb). The MAX300-AIR offers a real-time, fully automated benzene analysis that requires no manual sampling and minimal annualized cost.

The MAX300-AIR is an environmental mass spectrometer capable of measuring benzene in air at $< 0.3 \mu\text{g}/\text{m}^3$ (0.1 ppb). The speed and sensitivity of the analyzer make it an ideal solution for oil refinery fenceline compliance.

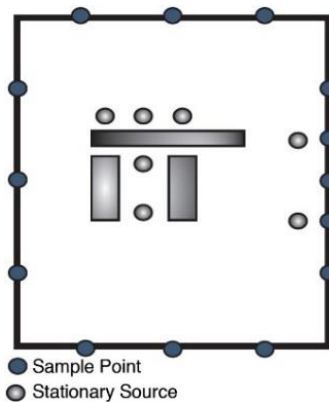


Figure 1. According to regulation, sample points may be placed on the fenceline, or along a smaller perimeter that encloses every stationary source.

MAX300-AIR Real-Time Gas Analyzer Specifications

- 24-7 Automated fenceline monitoring
- Benzene low detection limit $< 0.3 \mu\text{g}/\text{m}^3$ (0.1 ppb)
- No manual sample collection or lab analysis required
- Real-time benzene alerts for easy source identification
- $> 99\%$ Demonstrated uptime
- Low annualized cost
- Can measure additional required VOCs



Figure 2. The MAX300-AIR, real-time mass spectrometer, configured for benzene fenceline monitoring

Air is pulled continuously from each sample point to the MAX300 for analysis and the benzene concentration is reported to the refinery's data system in seconds. There is no need for personnel to manually collect passive diffusion tubes, and no risk of contaminating samples during handling and transport. Purchasing thermal desorption GC-MS systems, or paying for third-party laboratory analyses, is unnecessary.

Real-Time Response to Benzene Emissions

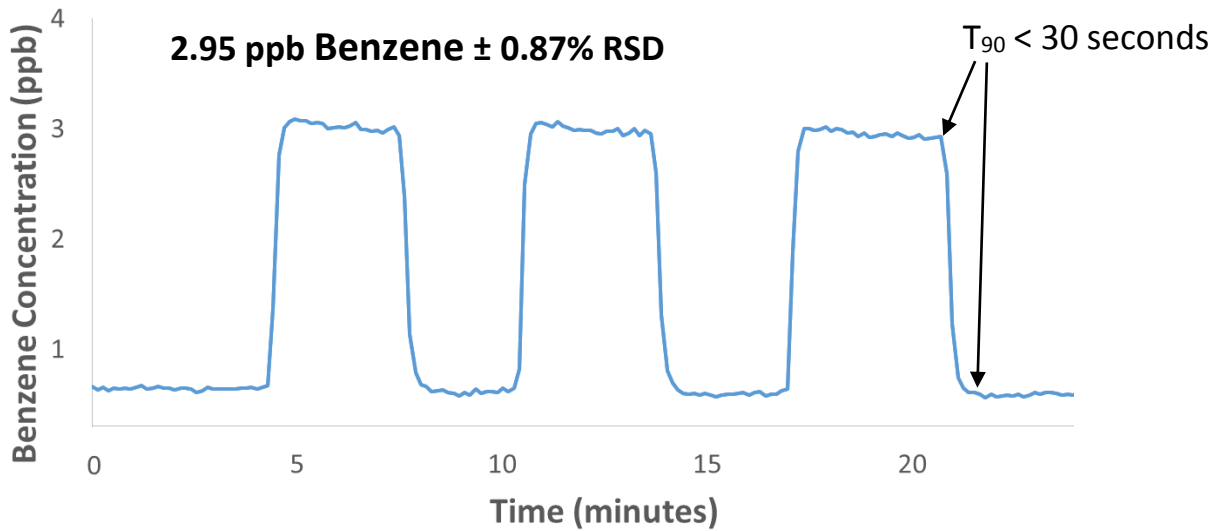


Figure 3. The MAX300-AIR performance on 2.95 ppb benzene. The sample alternates between air and a certified bottle of air containing 9.5 $\mu\text{g}/\text{m}^3$ (2.95 ppb) benzene.

The MAX300-AIR can report the presence of 9.0 $\mu\text{g}/\text{m}^3$ (2.8 ppb) benzene within seconds, and has the precision necessary for confident quantitation at trace concentrations well below the EPA actionable level (Figure 3).

When a benzene spike is detected, the refinery knows right away and can easily and accurately identify the source without maintaining weeks of exhaustive notes on plant operations. Real-time monitoring is safer for personnel and the surrounding community, and, combined with wind direction, can rapidly indicate transient benzene from neighboring industrial facilities, highways, rail lines, etc. As fenceline regulations increase to include additional compounds, they can easily be added to the MAX300 analysis method without requiring any hardware changes.

For over 50 years, Extrel has provided the very best support to industry, and installed hundreds of environmental and emissions analyzers at sites all over the world.

Table 1. A comparison of fenceline technologies

Monitoring option	Benzene update rate	Manual sample collection	Annualized cost	Additional laboratory investment	Performance unaffected by weather (rain, fog, wind)?	Can easily measure additional VOCs?
MAX300-AIR, environmental mass spectrometer	Real-time	None, automated continuous	\$5,000	None	Yes	Yes
Open-path monitoring (UV-DOAS, FTIR)	Real-time	None, automated continuous	>> \$40,000*	None	No	No
Passive diffusion tube monitoring network	1 update every 2 weeks	26 x per year	\$40,000*	Thermal desorption GC-MS, labor, or third-party analysis	No	No

* Annualized costs are based on data from *Fenceline Monitoring Technical Support Document*, in Docket ID Number EPA-HQ-OAR-2010-0682

