
POSITION PAPER

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Introduction.

In 2017 the Commission launched the process to revise the current EU-wide occupational exposure limit for benzene (1 ppm). Today the EU Commission is looking at the feasibility of several possible scenarios for setting a new OEL. Results are expected by April 2019. Considering the advice of the tri-partite advisory body, Commission is expected to present a legislative proposal in 2020.

To inform the ongoing review process, industry has done several assessments looking at health risks¹ and feasibility².

As an outcome of these assessments, Industry suggest taking a stepwise approach in revising the current OEL:

- Short term (< 3 years): implement an EU-wide OEL of 0.5 ppm

¹ Benzene Occupational Exposure Limit Proposed on basis of a Comprehensive Review of Worker Studies, LOA REACH consortium, March 2019

² Socio-Economic Analysis of proposed Occupational Exposure Limit for Benzene, Triskelion, March 2019

- Medium term (5-7 years): implement an EU-wide OEL of 0.25 ppm

Such an approach ensures that workers' health is adequately protected at the same time keeping it workable for industry to implement the necessary measures.

Securing adequate protection of workers

Building upon RAC's assessment of 2018, a scientific Committee of industry experts¹ has scrutinized nearly 100 relevant studies on benzene toxicology. The committee unanimously concluded:

- Below 0.5 ppm cancer risks are low.
Assuming workers would continuously be exposed to 0.5 ppm 8 hours a day for 40 years, the cancer risk is conservatively estimated to be below 2×10^{-4} . This risk level is one order of magnitude lower than acceptable occupational risk levels as set in Germany and the Netherlands. Recent adopted EU-wide OELs display a similar or even higher residual cancer risks.
- Below 0.25 ppm cancer risks can be ruled out.
Once occupational exposure is below this level no (cancer) effects are to be expected anymore. Therefore 0.25 ppm can be considered as a safe level.
Inherently further lowering exposure will bring no additional health benefits.

This result is not based on different science than used by RAC, but it is the result of a one-year effort reviewing all studies considered by RAC and ranking them according to their study quality and reliability. The resulting increased confidence in the data allows the derivation of a value that should not give concern for either haematotoxicity and genotoxicity.

A safe level of 0.25 ppm is even rather on the safe side. It considers an additional safety factor to cover uncertainty including that from possible bone marrow sensitivity.

Why stepwise lowering exposure

The past decade industry has continuously taken steps to reduce exposure to benzene. Use of closed systems and high-integrity equipment is today a common standard for handling high concentrated benzene streams (> 30 % benzene).

For critical tasks such as maintenance and (un)loading of cargoes – where you open the closed system – exposure is limited by cleaning, flushing and venting of equipment prior to opening.

By strictly controlling high concentrated streams, exposure levels to benzene are in

most refineries and petrochemical installations below 0.5 ppm. Even for critical tasks this value can be met with only limited use of respiratory equipment.

Bringing exposure levels continuously below 0.25 ppm requires an extensive revamp of existing equipment and infrastructure. Standards and procedures applied today for handling high concentrated benzene streams will have to be expanded to medium concentrated benzene containing streams (> 5 vol %). It means replacing at large scale existing equipment like pumps, valves, flanges, ... by high-integrity equipment and installing new equipment and infrastructure to allow proper flushing, draining and venting of equipment prior to maintenance.

This upgrade can happen every 5 to 6 years during so called turn-arounds of a plant.

Moving to 0.25 ppm: a significant commitment

Today we meet 0.5 ppm. We will move to 0.25 ppm on medium term. To do so refineries and steam crackers will invest up to 600 million Euros and spend additionally up to 200 million Euros/year on operating costs.

Lowering exposure below 0.25 ppm: no benefits and major uncertainties

As stated above 0.25 ppm can be considered as a safe exposure level. Lowering exposure below this safe level brings no actual health benefits.

Notwithstanding industry assessed the feasibility of lowering exposure towards 0.05 ppm (level originally recommended by the RAC). Main conclusions from this assessment:

- Advanced standards and procedures today applied for handling high concentrated benzene streams would have to be applied to all benzene containing streams (> 0.1%). More importantly, also small equipment giving rise to diffusive emissions such as block valves and safety valves will have to be changed by higher integrity equipment.

The bottom-line entails a complete redesign of existing plants. Total investment costs for refineries and steam crackers alone would mount up to 5000 million Euros. Yearly operating costs would exceed 1000 million Euros/year.

- Even when applying the highest standards, it remains uncertain if exposure levels would be consistently below 0.05 ppm. Knowing that a plant contains thousands

of pumps, valves, etc. statistically there will always be some minor leakages and exposure to benzene leading to an exceedance of 0.05 ppm.

- Increased use of stringent personal protection, such as self-contained or air-supplied breathing air, will be needed for executing critical tasks. It is questionable, whether this still can be done in a safe way.
- Checking compliance for an OEL of 0.05 ppm is technically very challenging. Today available monitoring equipment are not sensitive enough to allow verifying compliance in a reliable way according to EN689.

