

Health Risk Assessment

Benzene and Toluene Air Emissions from Ichthys LNG Facility's Acid Gas Removal Unit (AGRU) Hot Venting

Potential health impacts of benzene and toluene

The Ichthys LNG facility at Bladin Point processes natural gas. In 2025, it was found that emissions of two chemicals in air, benzene and toluene, had been underreported. NT Health asked an independent toxicologist from SLR to assess the potential health impacts of the Facility's Acid Gas Removal Unit Hot venting (AGRU HV) emissions on the community. The assessment considered:

- Short-term health effects from breathing in these chemicals including irritation of the eyes, nose and throat,
- Long-term non-cancer health effects from ongoing exposure, and
- The potential risk of cancer.

Air quality modelling

Air quality modelling for the Facility's AGRU HV emissions was carried out by experts at ERM. The modelling looked at emissions of benzene and toluene from AGRU HV, since this process of 'hot venting' release higher levels of emissions.

ERM looked at three situations:

- **Actual Operations:** Normal day-to-day operations, based on real operations data,
- **Maximum Emission Scenario 1:** A conservative "worst-case" scenario, where one section of the facility is not able to use its normal pollution control system and is instead releasing gas directly through the exhaust, which leads to higher emissions, and

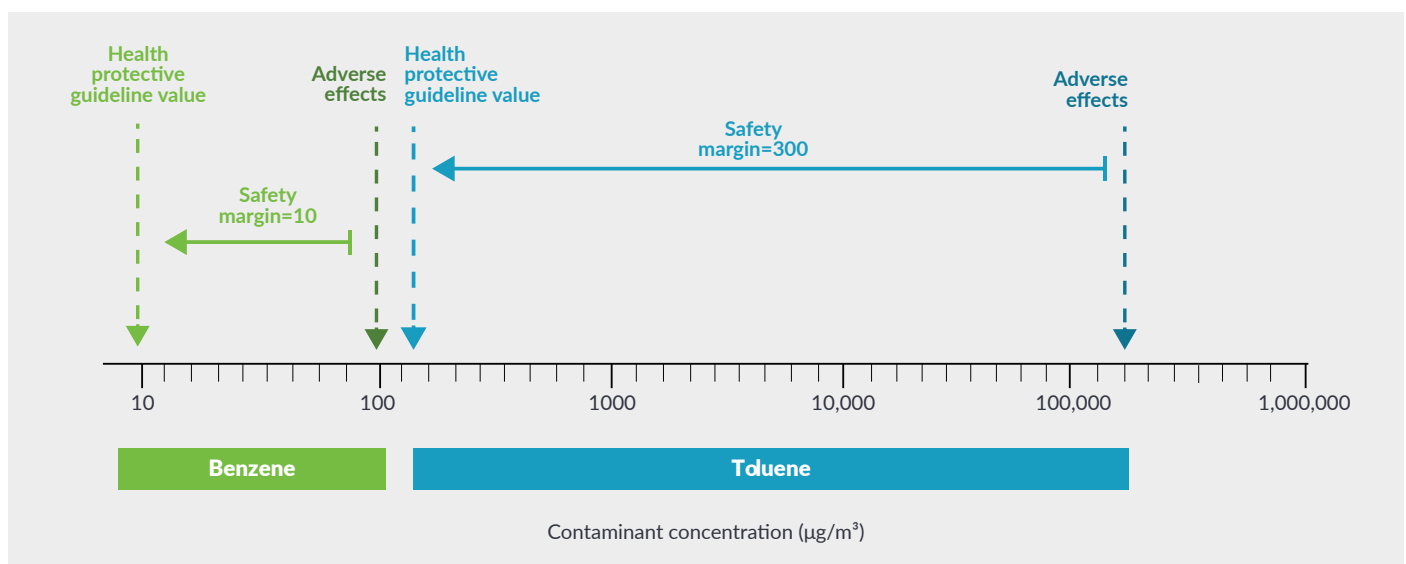
- **Maximum Emission Scenario 2:** An “extreme worst-case” scenario, where the facility is releasing more pollution than normal because both parts of the plant are bypassing their usual treatment systems at the same time.

The ‘extreme worst-case’ scenario is designed to be very cautious and does not reflect typical operations. It is likely to overestimate the real amount of emissions.

The predicted emissions were added to the actual measurements taken in the community so the assessment includes the total amount of these chemicals from all sources combined.

Why guideline values are set conservatively

Health guideline values are set conservatively, with large safety margins built in. This means the guideline values are much lower than the levels known to cause health effects, to make sure people are well protected. The figure below shows an example, comparing the level where health effects may occur after long-term exposure with the much lower, more conservative guideline value.

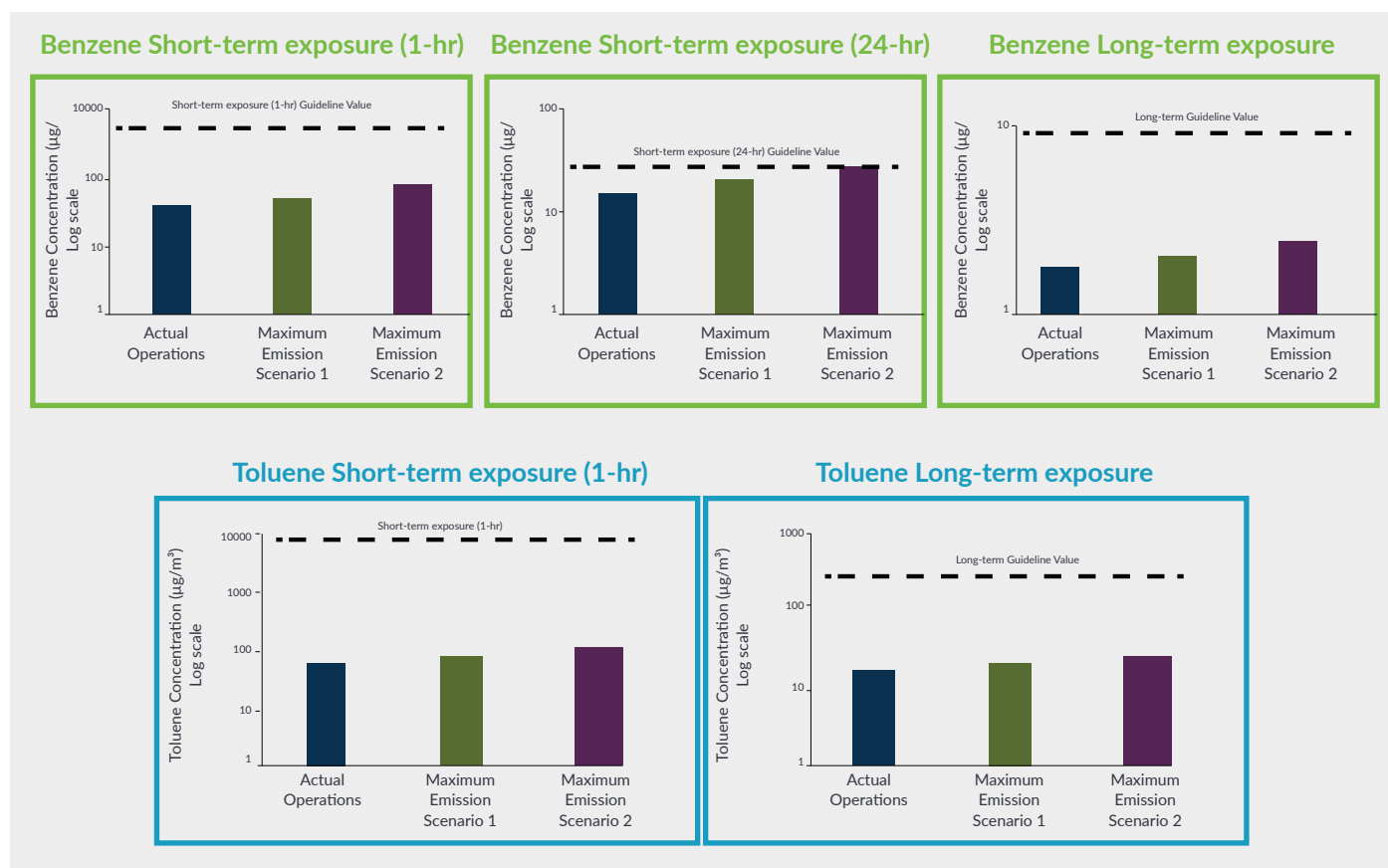


Comparing Predicted Air Levels with Health Guidelines

SLR compared the predicted air levels for **actual operations** and **Scenarios 1 and 2** with health guideline values that are set to protect people. The results show that the levels of benzene and toluene predicted by the modelling are low and within health-based guideline values. The only time a guideline is reached is in the most ‘extreme worst-case’ scenario for benzene, and even then, it just meets the guideline rather than exceeding it. This ‘extreme worst-case’ scenario is designed to be conservative, meaning it is set up to overestimate risk. The health guideline it is compared against also includes a very large safety margin - it is 300 times lower than the level at which health effects were seen -

so even reaching this point does not indicate harm. The shorter-term (1-hour) guideline for benzene, which is based on the same health effect, is also well below the level of concern.

Overall, the assessment shows that **benzene and toluene emissions from the Facility's Acid Gas Removal Unit Hot Venting (AGRU HV) are unlikely to pose a health risk.**

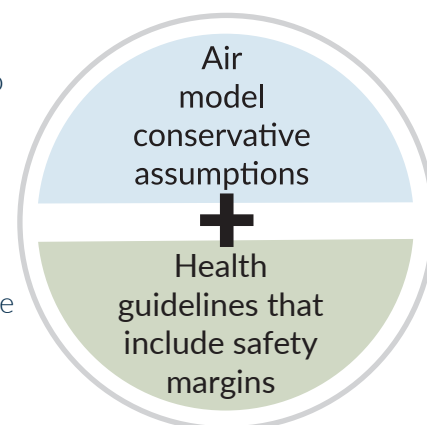


Conservatism in health risk assessment

This human health risk assessment for benzene and toluene was designed to be very conservative. It used:

- worst-case assumptions for air emission modelling, and
- health guidelines that already include big safety margins.

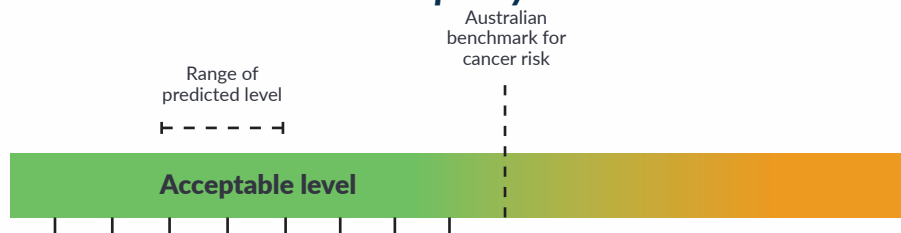
This means the calculations are more likely to overestimate how much people could be exposed, rather than underestimate it. In real life, actual exposures are expected to be lower, and the risk to people living near the facility is therefore expected to be low.



Cancer risk assessment

The study also looked at the long-term cancer risk from breathing benzene in the air. The results were compared with health benchmarks used in Australia to manage environmental cancer risk. The predicted risk levels were below these benchmarks.

This means the cancer risk from the Facility's Acid Gas Removal Unit Hot Venting (AGRU HV) emissions is very low and the concentration of benzene is considered acceptable under current Australian health policy.



Recommendations

SLR made the following recommendations to ensure a more complete understanding of potential exposures:

- For future studies, it is recommended that air quality modelling looks at emissions from the whole facility, not just one part of the plant. It should also include other related chemicals, such as ethylbenzene and xylenes, at a minimum.
- There is good confidence in the air monitoring data used for the modelling, but it is not clear whether it fully captures changes over time and different operating conditions across the Middle Arm Precinct. For this reason, an independent, long-term air monitoring program in the Darwin area is recommended. This would help give regulators and the community confidence that current and future industrial developments are safe.
- It is recommended that a whole-of-Darwin airshed health risk assessment be carried out that looks at all major sources of air pollutants across facilities, not just one source at a time. This would allow the combined effect of all sources operating at the same time to be assessed.

These recommendations would help give regulators and the community confidence that current and future industrial developments are safe.