Diesel exhaust management: Our journey of continuous improvement

Rob McDonald
Vice President Health and Hygiene, Group HSE
Protecting the health of our people

Our HSE Framework is critical to protecting the long-term health of our people

- Group Level documents
- Organisational design protocol
- Internal audit and third party assurance
- Regular reporting of lead and lag indicators to the Executive Leadership Team (ELT) and Board,
- Global Strategic Position statements and Maturity Curves
- Annual ELT KPIs tied to long term health public targets
Group Level documents – setting internal occupational exposure limits

Why this is important
• Science continues to evolve but regulations lag far behind
• Default to regulatory limits would result in a material risk to our people

The process
• Continuous monitoring of the science, regulators and OEL setting bodies for our most important occupational exposures
• Annual benchmarking with Peers
• Independent expert review triggers
Diesel OEL review process

2015 diesel exhaust OEL of 0.1 mg/m$^3$ (elemental carbon)

**Trigger and response**

- 2012 IARC classification $\rightarrow$ Original Driscoll Review $\rightarrow$ 50% rule
- 2014 Vermeulen Paper $\rightarrow$ 2nd Driscoll Review $\rightarrow$ Need for formal dose-response curves
- 2015 IOM Review $\rightarrow$ Recommended “as low as technically feasible”
- September 2015 $\rightarrow$ Adopted IOM recommendation
The IOM analysis

IOM's recommended quantitative risk assessment

Equivalent to 45 years exposure at present OEL

Figure 10: Exposure-response relationships derived by Silverman et al (2012) showing ORs plotted against cumulative exposure
What are others saying

US Health Effects Institute (November 2015):
• “The Panel concluded that the data from the studies (as used by IOM) provided results and data that provide a useful basis for quantitative risk assessments of exposures in particular to older diesel engine exhaust”

Finnish Institute of Occupational Health (December 2015)
• Recommended a target OEL of 5 ug/m3 except in underground mines, where the recommendation is 20 ug/m3

US NIOSH (May 2016) – Robert Parker Lead Risk Investigator
• To present results of assessment at EPICOH conference Barcelona, September 2016. Paper under revision ahead of publication

SCOEL
• Commenced OEL risk assessment review December 2015 and due to report in December 2016
Our Response

Current Operations:

• Main exposure risk is in underground mines. Also need to consider “fracking” and heavy vehicle maintenance workshops
• In our underground operations, we have an initial target of 0.03 milligrams per cubic metre (mg/m$^3$)
• All operations to report back as to what may be technically feasible
• Key challenge is lack of access to the highest tier, lowest diesel emitting engines or suitable electric substitutes

Design into potential future mines:

• In our Potash project mindset is “eliminate diesel where feasible”
• To date Potash have identified opportunities for 75% of underground fleet to be battery electric, with the remainder of fleet Tier 4 “Final” where available

Engage with others:

• Share information and how we are responding
• Stimulate discussion and debate