

ROUNDTABLE DISCUSSION SUMMARY ON

SAMPLING TECHNIQUES & TLVs

OCTOBER 13, 2006

FACILITATOR – Michel Grenier, CANMET

RECORDER - John Vergunst – Ontario Ministry of Labour

PARTICIPANTS

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Frank Depetrillo – General Manager, Rypos

Fred Pelletier – Mobile Planner, Coleman Mine, Inco

Tom Ferguson – Inco

Dave Stewart – Worker Representative, Xstrata, CAW

Jack Purchase – Hy-Drive Technologies Ltd

Darren Kruger – Operator OH&S, Agrium, USWA

Dale Gorham – Operator OH&S, Agrium, USWA

Joe Johnson – Newmont Mining Co

John Blogg – Ontario Mining Association

Charles Westover – Fluid Management Supervisor, Newmont Mining Co

Gary Brouse – Industry Specialist, Cashman Equipment Co

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DISCUSSION

The discussion started with the participants identifying themselves and speaking to the topics that concern them most. Because similar issues were discussed by numerous participants, the issues have been grouped.

VENTILATION

The potash mine workers are pushing for regulations to control the use of series or cascading ventilation. The ventilation is not being used properly, the contaminants from one heading are being blown into the next. More and more personal vehicles like Toyota Landcruisers are being

used underground. All their diesel equipment is provided with diesel oxidation catalysts. This mine uses continuous miners which don't require filters. The mine has only a few scoops for clean-up operations. Currently, Saskatchewan regulations require a minimum ventilation rate of 105 cfm/bhp.

The mining industry can only reduce emissions to the level of the technology provided, such as clean engines. Ventilation has always been important. In Ontario a 100 cfm/bhp must be provided for every horsepower in the ventilation circuit. Deep mines are using a figure of 150 cfm/bhp for design purposes, mainly to provide cooling. Other jurisdictions in Canada mandate the use of the ventilation rate determined by the CANMET and/or MSHA certificated ventilation rate. Even with an engine emitting only water vapour and carbon dioxide an engine would still require some 44 cfm/bhp to dilute the CO₂ to below the limit of 5,000 ppm.

One participant reminded the group that ventilation is difficult in older mines with extensive workings (1 – 2 mile orebodies) and old infrastructure. It was pointed out that in the U.S. only coal mines are required to provide the certified ventilation rate. Metal and non-metal mines only have to meet the DPM standard.

DOC AND NITROGEN DIOXIDE LEVELS

The Ontario salt mines provide good ventilation at 100 cfm/bhp, but nitrogen dioxide is a major concern, because of the long residence times of the ventilating airflows within the mine. The mine does not use DOCs because of the conversion of nitrogen oxide to nitrogen dioxide. The mine recently brought in a new Elphinstone 2900 which was equipped with a DOC and had the wrong injector timing. As a result, the mine experienced high levels of nitrogen dioxide.

EMISSION TESTING

To ensure the salt mine engines are not emitting an excessive amount of gas, the mine samples the undiluted carbon monoxide in the exhaust. The mine has not gone to torque stall tests and are still testing at high idle. They do not have tachometers on their machines and the high idle is determined by ear. The mine has not gone to elaborate instrumentation like the ECOM and is still using colorimetric tubes and a cooling probe to sample the undiluted carbon monoxide.

Many jurisdictions require tailpipe testing to determine the health the engine, such as MSHA, Quebec, Ontario, etc. Concern was expressed from several participants on how to properly perform repeatable emission testing underground. Equipment with torque converters can be loaded, but not light duty equipment with automatic transmissions. One participant stated that using an engine control module (ECM) to control a test may give misleading results. New engines can compensate for faults with the engine to such a degree that "the piston could be falling out before the coolant level goes down".

Industry participants want an easy pass/fail method to test emissions, not a laboratory instrument or scientific degree to test it.

AMBIENT DPM SAMPLING

Saskatchewan Regulation requires the mines to use the NIOSH 5040 sampling method but have not set a DPM limit.

The salt mines in Ontario are using NIOSH 5040 method, although only the respirable combustible dust is legislated. The NIOSH 5040 method allows a more accurate measure of low exposures than the respirable combustible dust method. Quebec has regulated diesel particulate to 0.6 mg/m^3 ($600 \text{ }\mu\text{g/m}^3$) measured as respirable combustible dust. This is the lowest limit that could be set using this method. Ontario's DPM limit is $1500 \text{ }\mu\text{g/m}^3$. In setting its' DPM limit MSHA claims that their limits are a feasibility rule not a health standard. However, it was mentioned that MSHA's regulations are technology forcing.

MSHA Final Rule for Underground Metal and Non-metal Mines

- *400 $\mu\text{g/m}^3$ of total carbon – effective 2001 interim rule*
- *308 $\mu\text{g/m}^3$ of elemental carbon – effective May 20, 2006
(determined that 30% of the total carbon is organic carbon and therefore $400 \times 1.3 = 308$)*
- *350 $\mu\text{g/m}^3$ of total carbon – effective January 20, 2007*

Comments were heard that probably 90% of a worker's exposure can be received while mucking a poorly ventilated face. The sampling data both in Canada and the U.S. show that mucking consistently shows the highest exposure levels in the mine. In many metal mines the scoop goes into the heading to clean up the flyrock to allow the scissor-lift in to fix the ventilation duct.

Extended shifts in many mines compound the problem of DPM exposure. However the sampling data again shows that travelling throughout the mine does not appear to be a major contributor to exposure as working at the face with a large diesel unit. The social aspect of regulations was questioned such as, why lower diesel emissions and allow workers to smoke.

SUMMARY

According to the mine companies, control of DPM in the U.S. will be best achieved with improvements to ventilation and use of clean engine technology. Meeting the MSHA DPM regulations is a major challenge to the mining industry.

Because of the Diesel Emissions Evaluation Program, many of the participants feel that there are now better controls underground.