

Vibration Project Fact Sheet

Surface Haulage Trucks Whole-body Vibration Assessment

OBJECTIVE:

To quantify WBV exposure levels during the operation of surface haulage trucks in Ontario surface mining environments



Background

Operators of large earth moving equipment are exposed to potentially hazardous levels of whole-body vibration (WBV). The Ontario Mining Industry reports that while most were unspecified occupational injuries involving the back, 16% of all traumatic injuries occurred while operating haulage trucks.

Previous studies measuring WBV exposure during the operation of heavy haulage trucks observed potentially hazardous vibration acceleration in the z-axis (vertical direction). Unloaded travel was associated with the highest vibration accelerations followed by loaded travel, loading, and dumping respectively. Speed of travel and driving terrain had the greatest affect on vibration magnitude. The decreased vehicle mass and increased driving speeds associated with unloaded travel contribute to the high vibration accelerations.

Operator exposure to WBV was measured during the operation of 30-150 ton haul trucks at several surface mining environments in Ontario. Hazard potential was assessed using

ISO standards for WBV exposure with respect to health.

Methodology

The measurement of whole-body vibration is conducted in accordance with the guidelines set out in the ISO 2631-1 standard. An accelerometer is placed between the individual and the vibration source at the point of contact.

The ISO 2631-1 standard also provided guidance on how to process the vibration signal. The most common processing method results in a frequency weighted rms (root mean square) acceleration value expressed in m/s^2 . The rms acceleration is determined for each basicentric axis, and the axis with the dominant signal is used to determine health effects according to the ISO 2631-1 Health Guidance Caution Zones. For an 8 hour shift a frequency weighted rms value, $<0.45m/s^2$ - no major health effects anticipated; $0.45-0.9 m/s^2$ - caution with respect to health risks (preventative measures required); $>0.9 m/s^2$ - health risks are likely.

Applications

- Average daily WBV exposures calculated for each vehicle tested confirmed that operators may be exposed to potentially hazardous levels of WBV
- Results confirmed earlier findings suggesting that decreased driving speed, (particularly while driving unloaded) and smoother road surfaces may help to reduce vibration accelerations and decrease health risk to the operator

For more information

Laurentian University
Professor, Tammy Eger
(705) 675-1151 ext. 1005

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