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Red Dog Mine

Concentrate Storage Building Truck Loading Drive-Through Dust Control System Assessment

August 2005

Purpose

A monitoring plan was developed to establish the change in dust deposition on concentrate haul trucks before and after the installation of a truck loading dust control system. Rather than try and measure the amount of dust settling on the truck and trailer, which would be very difficult, a monitoring plan was developed to measure the amount of dust in the air within the truck loading area as a surrogate. It was theorized that if the dust generated during the truck loading operations was captured and blown back into the concentrate storage building (CSB) with the new truck loading dust control system that a decrease in Total Suspended Particulates (TSP) would be observed in the air after its installation and utilization. Subsequently a quantitative reduction in TSP could indicate a qualitative reduction in dust deposition on the concentrate haul trucks.

Methods

The monitoring system was designed to collect TSP on a 1-day-in-3 schedule. An ambient air high volume (hi-vol) sampler was used to measure the TSP. The hi-vol sampler draws air into a covered housing through a filter using a high flow rate blower at 1.1 to 1.7 m^3 / min and collects the TSP on an 8" x 11"filter. The system normally operates for a 24-hour period and the total volume of air pulled across the filter is measured and corrected to standard conditions. Initial and subsequent weighing of the filter was used to determine the mass of material collected on the filter over the 24-hour sample period. Determination of TSP concentration was then calculated and reported as the mass of TSP material per cubic meter of air ($\mu g/m^3$).

For the determination of lead and zinc within the TSP a section of each of the filters was submitted for laboratory XRF analysis. The concentration of lead and zinc on the filter was then used to determine the concentration of lead and zinc in the air sample and is also reported as the mass of lead and zinc per cubic meter of air ($\mu g/m^3$).

To help compare the data, operational data was collected as to the number of truck trips, the tons of concentrate loaded (hauled) and the moisture of the concentrate during the sampling periods.

Monitoring was conducted from 1/19 to 3/19/2004 and from 12/5/2004 to 2/21/2005 to represent the pre-modification and post-modification sample periods respectively. The monitoring was conducted in the winter because of the higher potential for concentrate dust due to freeze drying.

Results

Table-1 summarizes the pre and post data sets and Tables-2 through 7 (attached) contain the detailed individual sample data sets for TSP, Lead, and Zinc concentrations.

The average TSP, Lead, and Zinc concentrations for the sample periods were higher before the truck loading dust control modification verses after the modification.

Reductions in concentrations were 48%, 49%, and 52% for TSP, Lead, and Zinc respectively.

As expected the characteristics of the dust before and after the dust control modifications did not changed (i.e. the ratios and percentages of metals in the dust did not change).

Table-1

Period	**Avg # Loads**	**Avg Tons Hauled**	**Avg TSP** ($\mu g/m^3$)	**Avg Lead** ($\mu g/m^3$)	**Avg Zinc** ($\mu g/m^3$)
Pre-Modification	32.6	3,708	1,463	94	437
Post - Modification	34.4	4,113	756	48	211
Percent Change	6%	11%	-48%	-49%	-52%

Conclusions

The TSP data demonstrates a significant quantitative decrease of approximately 50% between the pre and post dust control modification as it relates to concentrate haul truck loading activity. Therefore, the new dust control system installed for the mine CSB truck loading activities appears to be effective in reducing deposition on the concentrate haul trucks.