



Rio Tinto

**Comments on Technical Air
Dispersion Modeling Issues
of Concern to Rio Tinto**

**Presented at EPA's 10th Modeling
Conference by Mark Bennett, CH2M HILL**

March 15, 2012

Rio Tinto

Summary

- Stringency of new limits, forms of the standard and high background concentrations make dispersion modeling compliance demonstrations challenging for all three of these NAAQS
 - Requires improved performance of AERMOD and expedited addressing of known deficiencies
- Specific Issues
 - Low Wind Speed Algorithm Issues with Respect to Low-Level Sources
 - AERMINUTE will result in more low wind speeds
 - Buoyant Line Sources
 - Pit Retention
 - Impacts of Frequent Updates to AERMOD by EPA

Low Wind Speed Algorithm Issues with Respect to Low-Level Sources

- AERMOD known to overpredict impacts for near-ground level releases during low wind speed, stable conditions.
- For mining operations, emissions from haul roads (a near ground level release) are frequently the highest modeled impact sources and can be the primary driver for the permit approval for a site.
- A published peer reviewed study has demonstrated an alternative methodology that can be easily implemented in AERMOD that significantly reduces the overprediction bias and leads to better overall model performance.

ASOS DATA and AERMINUTE

- Meteorological stations throughout the U.S. have gradually replaced manned observations with Automated Surface Observing Stations (ASOS). This led to a marked increase in missing or calm hours in the hourly observations which degrades the quality of air dispersion modeling analyses.
- EPA releases AERMINUTE, which processes 1-minute ASOS wind data to generate hourly wind speed and wind direction averages to supplement data within standard hourly surface data.
- NWS converting ASOS wind speed measurement technology to sonic anemometers which have ability to measure and record wind speed at low as 0.5 mph.
- Last two items result in many more hours of data for low wind speeds as well as lower overall wind speeds in modeling databases.

Modeling Exhaust Emissions from Vehicle Traffic

- Tailpipe emissions from haul truck exhaust are generally hotter than the ambient air (thermally buoyant). Therefore, the volume source algorithm in AERMOD does not accurately account for thermal plume rise of tailpipe emissions.
- For mining operations, emissions from haul trucks could be a substantial portion of the facility's overall NO_x and SO_x emissions.
- The use of a buoyant line source algorithm in AERMOD, similar to CAL3QHC or CALINE4, would better characterize the dispersion of emissions generated by thermally buoyant sources of tailpipe emissions.

AERMOD's Pit Retention Algorithms Need Updating and Manual Needs Better Guidance for Use

- Pit Retention algorithms added to EPA's ISC model in 1995
 - Estimates impacts for particulate emissions originating from a below-grade open pit
 - ISC Users Manual “The pit retention and wet deposition algorithms have not undergone extensive evaluation at this time, and their use is optional.”
- Open-pit algorithm derived from limited wind tunnel studies
 - Proportionality constants may not be applicable
 - Characterized by a rectangular shape with an aspect ratio (length/width) of up to 10 to 1
 - Example pit 225 m by 450 m by 45 m deep
 - Pits in wind tunnel study symmetric
 - CFD study by University of Utah found large-scale recirculation only in symmetric pits

ISC – Wind Tunnel Results

MODEL COMPARISONS WITH WIND TUNNEL

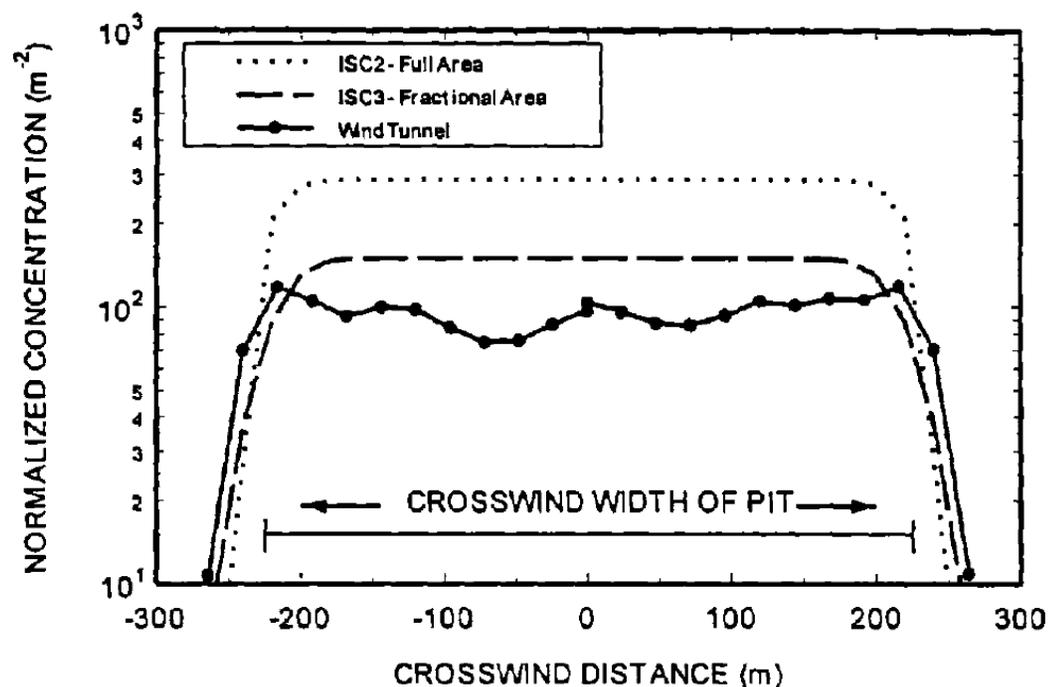


Figure 4. Horizontal concentration distributions at the downwind edge of a 225m X 450m pit with effective depth of 45m and source at the pit floor. ISC2 Full Area is the distribution from the ISC2 model and ISC2 Partial Area is from ISC3.

- Source: Petersen, W. B., and S. G. Perry, 1995: Improved algorithms for estimating the effects of pollution impacts from area and open pit sources. EPA/600/A-96/019

Conclusion

- As EPA prepares new NAAQS, coordination with stakeholders, including the regulated community, necessary to identify real-world compliance issues
- Rio Tinto appreciates EPA's increased collaborative efforts with the regulated community, and pledges its support of these and future collaborative approaches
- EPA's responsibility to provide tools that **accurately** evaluate impacts in order to avoid unnecessary barriers to beneficial economically growth
- Rio Tinto has discussed these concerns with its fellow National Mining Association member companies and believes they are important issues to much of the industry
- Rio Tinto will be supplying detailed written comments