ENVIRONMENTAL DUSTTRAK™ AEROSOL MONITOR EXTENDED BEAM DUMP DESIGN FOR IMPROVED PERFORMANCE

BY SCOTT NORMAN

Introduction

The beam dump is a section of the optical chamber where the optical detector is set back from the aerosol steam being directed through the optical chamber. Overtime, aerosol can collect in the beam dump and cause measurement drift due to increased light scattering.

As part of the DustTrak™ II and DustTrak DRX Aerosol Monitor redesign in 2008, the beam dump was expanded away from the particle flow path to reduce the potential for particle deposition. Constraints with the design of the case and the optical chamber limited the distance the beam dump could be expanded.

To improve long-term reliability for 24/7 outdoor monitoring, the beam dump for the Environmental DustTrak Aerosol Monitor has been extended further from the particle flow path. In addition, 0.5 L of purge flow is directed through the beam dump to keep contamination from building up.

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EXTENDED BEAM DUMP DESIGN FOR IMPROVED PERFORMANCE

ENVIRONMENTAL DUSTTRAK™ AEROSOL MONITOR

Test Results

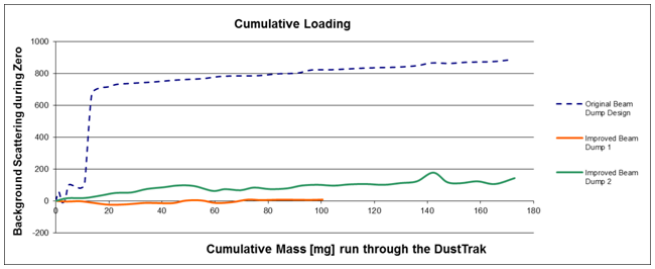
The new beam dump design was tested to determine how it performs when exposed to harsh conditions. The following three tests were performed to challenge the beam dump:

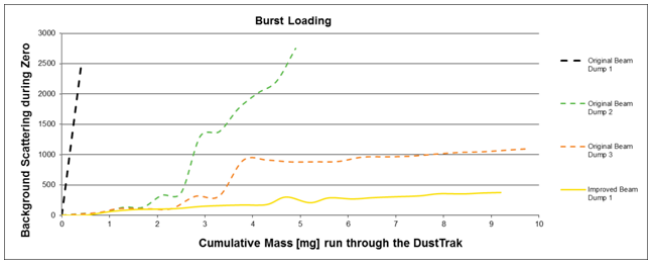
+ **Cumulative loading** – sampling 100 to 200 mg/m^3 of dust continuously through the instrument to test how the beam dump handles high concentration loads.
+ **Burst Loading** – sampling of high particle concentrations >400 mg/m^3 through the instrument to determine how well high level dust spikes are handled.
+ **Inlet blockage** - plugging the inlet while the unit is running to see if flow blockage causes accumulated aerosol to contaminate the optics.

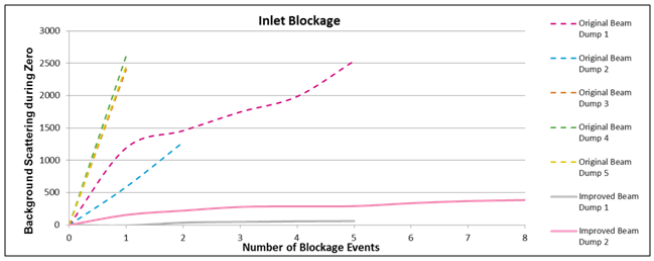
The graphs summarize the results of the test by plotting the level of background scattering during a zero reading. This is indicative of false signal readings when the zero filter is in place and the instrument should display no aerosol concentration.

The difference in background scattering during Zero between the old beam dump design and the improved beam dump design show the effectiveness of the new design at eliminating error readings and drift associated with aerosol contamination in the optics.

This design modification is just one of many made-for-purpose changes made to the Environmental DustTrak Aerosol Monitor to improve long-term performance even in the most challenging environments.







Results

These test results indicate the extended beam dump design reduces the unwanted signal error associated with light scattering from contamination in the optics. This key feature will enable reliable long-term monitoring with accurate data.

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