A Dust Management Program

for the Darling Downs Coal Seam Gas Industry

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Context

Recent years have seen the expansion of the number of CSG wells on agricultural land. Purpose built roads have been constructed to service the wells. Dust, kicked up by CSG trucks traversing these roads, lands on the adjacent crops. This causes a loss in productivity for the landholders, for which the CSG companies may be liable for damages.

Problem Definition

- There is little formally documented information on the impact that CSG related traffic has on surrounding grazing and pastoral land.
- The current compensation model is built upon conjecture and has been criticised for benefiting only some and not accurately representing the diverse impacts of CSG traffic.
- Existing dust monitoring devices are not economically viable for widespread data collection.
- A measruing device should be easy to use and independ-ent of an external power source.

Objectives

- A cost effective and reusable dust monitoring device for wide scale implementation across rural Queensland.
- An adaptable implementation model.
- A method of immediate data analysis in the field.
- A compensation and remediation model extrapolated from data collected on site.

Collection Device Overview

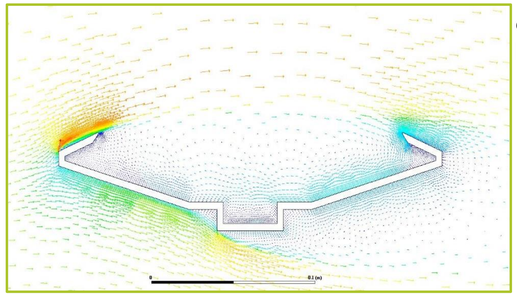
COLLECTION CYLINDERS

Horizontally flowing dust is captured using 4 collection cylinders spaced around the shaft of the device.

- Inside the cylinders, adhesive strips clip into place to provide a cheap and replaceable collection medium
- Percentage area coverage – of dust on the adhesive – is read in the field by a technician with a hand held reflectometer
- Cylindrical housings protect samples from the elements

SHAFT

- Aluminium, 3-piece, modular shaft allows for simple assembly/disassembly
- Disassembled, device packs away into a 1200x300mm canvas bag
- 8kg shaft mitigates overhead assembly risk



FRISBEE GAUGE

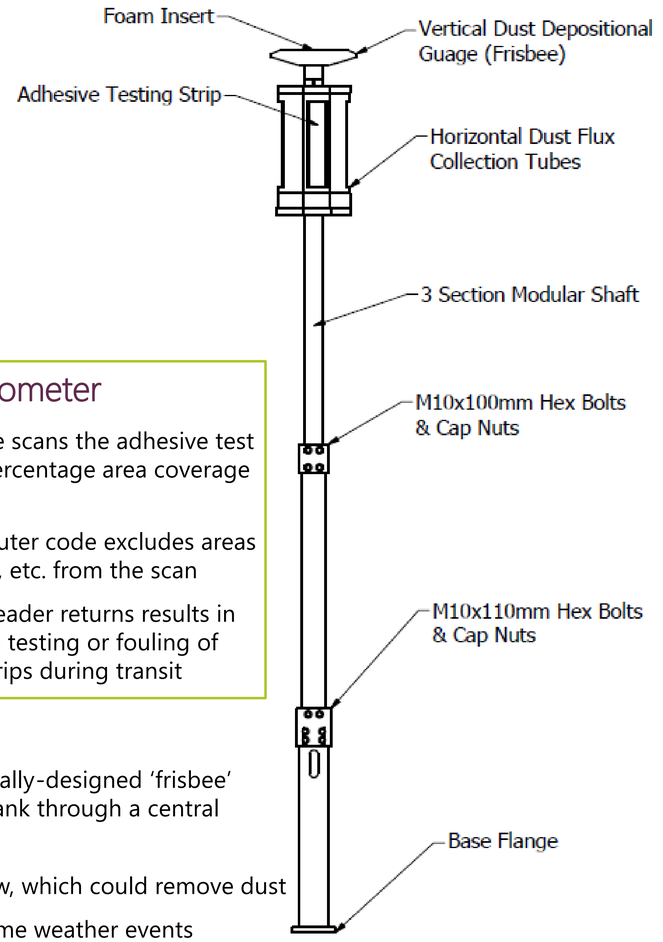
Vertically settling dust is captured in an aerodynamically-designed 'frisbee' collector; dust collected is washed into a collection tank through a central hole.

- Aerodynamic design minimises recirculated airflow, which could remove dust
- Foam insert traps dust, minimising losses in extreme weather events
- Hydrophobic inner surface encourages water beading, effectively transporting dust to the collection tank
- Water/dust mixture from a tank at the base of the 'tower' is filtered and dehydrated to gauge dust deposition levels

Reflectometer

A handheld device scans the adhesive test strips returning percentage area coverage in the field.

- Adaptive computer code excludes areas fouled by grass, etc. from the scan
- Cost effective reader returns results in the field, no lab testing or fouling of the adhesive strips during transit



Experimental results

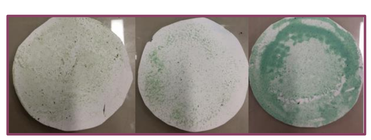
Three prototypes were tested in Marburg, Queensland in order to establish proof of concept. Low traffic conditions and a wet month saw low dust levels recorded. However, the two devices returned comparable data:

VERTICAL DEPOSITION

Vertical deposition results were collected monthly.

Devices 1 and 2 returned 18.79 and 17.85 mg/m2/day, respectively. Within ~5% of each other.

Device 3 showed signs of contamination - attributed to a compromised collection tank seal.



HORIZONTAL DUST FLUX

Percentage area coverage was measured weekly with all three devices returning comparable data.

Reflectometer readings ranged between 0.008% and 16%, correlating strongly to the prevailing wind direction of the sample period.

Heavier traffic and close proximity to agricultural activity seen to cause the range in maximum readings.

Future Work

- Further prototyping will see improvements to seals and a slide on/off collection assembly to streamline the data acquisition process.
- A database for result collation needs to be established with the intent to track dust levels across CSG affected properties and identify high impact weather conditions and at risk areas.
- Construction of a hand held, battery powered reflectometer using the current Matlab code.
- Collaboration with industry partners to optimise the Dust Management Plan in accordance with current company practice.