COMMUNITY INFORMATION

BROOKLYN DUST MONITORING PROGRAM – BACKGROUND AND METHODOLOGY

August 2010

SUMMARY

In October 2009, EPA began an air quality monitoring program in the Brooklyn area surrounding the Brooklyn Industrial Estate. The program aims to obtain information about the levels and impact of airborne dust, primarily particle matter 10 micrometres or less in size (known as PM_{10}), coming from the industrial estate.

The original monitoring program measured the levels of PM_{10} in the air and compared the measured levels to the national standard. The monitoring program has recently been expanded to also provide information on the components and composition of the PM_{10} in the air.

Temporary monitoring stations have been set up in the residential area adjacent to the Brooklyn Industrial Estate. EPA also has a network of permanent air monitoring stations across Melbourne and Victoria. The stations at Altona, Deer Park and Footscray measure air quality for the western suburbs.

WHAT IS EPA MEASURING?

The dust monitoring program comprises two components:

- One component involves continuous monitoring of the concentrations of PM_{10} and $PM_{2.5}$ particles and wind conditions at a number of sites. $PM_{2.5}$ is particle matter that is 2.5 micrometres or less in size, which tends to be primarily from combustion sources – motor vehicles, solid fuel fires, incineration and industry processes.
- The second component involves measurement of asbestos and respirable silica and collection of PM_{10} for chemical analysis, which will determine the composition and characterisation of particles.

Asbestos and respirable silica will each be sampled and analysed using different sampling methods and analysed by two different laboratories.

PM_{10} particles for chemical analysis will be collected by two other sampling techniques and analysed by three other laboratories. The chemical analysis involves laboratory analysis for 20 different chemical elements and 18-25 chemical species.

The analysis is complex and needs to be able to detect very minute amounts of chemicals. This requires specialist laboratories located in NSW and Victoria.

WHERE IS EPA MEASURING?

- Site 1 – Molab 1, Brooklyn (Brooklyn Reserve). This site replaces the Brooklyn school site and measures PM_{10} and $PM_{2.5}$ and will also collect samples to be analysed for composition and characterisation. The equipment used for monitoring is similar to the equipment used in the rest of the EPA air monitoring network.
- Sites 2 and 3 – residential sites in Yarraville and Brooklyn. These two sites as well as site 1 (used for comparison purposes) will measure only indicative levels of PM_{10}, using different monitoring equipment called Dustrak. These sites give an indication of the spread of PM_{10} levels in the general area.
- Site 4 – Sunshine West. This monitoring station (under installation) will measure PM_{10} and $PM_{2.5}$. It will also provide information on the transport of dust, from both the industrial estate and the surrounding Sunshine West area upwind of the estate, during prevailing moderate to high northerly and southerly winds.

The measurements from the monitoring sites around Brooklyn are also compared with background representative levels measured at EPA's air monitoring station at Footscray as a way to determine local sources of dust.

WHAT WILL THE MONITORING TELL US?

Continuous PM_{10} concentration analysis

The measured particle concentration is assessed against the concentrations specified as the national standard. Wind speed and direction are used to identify the direction of the dust source.

On the basis of the elevated particle levels frequently measured above the national standard during the summer period, and observations from surveillance and site inspections, EPA was able to issue regulatory notices on potentially dust-creating industries in Brooklyn, requiring them to reduce dust from their properties.

Asbestos, respirable silica and PM_{10} analysis

The chemical analysis will estimate the composition of the particles and assist in identifying general sources

such as soil, smoke, sea salt, vehicle emissions and possibly some potential industry sources.

The determination of the airborne concentrations of asbestos, respirable silica and specific elements will provide the data to undertake an air quality risk assessment to evaluate the health risk posed for the concentrations measured.

A statistically sound air quality risk assessment requires about 12 months of data, to ensure seasonal variations are considered.

EPA will be able to provide some interim findings of the analysis at the September 2010 BCRG meeting, but there will not be sufficient data for a full air quality risk assessment at that stage.

LIMITS OF THE MONITORING PROGRAM

The ability to identify sources will be limited when the dust generated from a number of the sites is similar and then mixed together in the air.

Every individual also has a unique level of personal health, and the effect of dust on an individual cannot be determined through this study. This monitoring program will therefore make simple comparisons of measurements in Brooklyn and its surrounds against the health-based standard to judge the effect on a population as a whole, rather than an individual.

PARTICLE CONCENTRATION DATA TO DATE

To date (between 28 October 2009 and 14 July 2010), the monitoring program has measured 31 days when PM_{10} levels were above the national air quality objective.

During spring, summer and early to mid-autumn, days above the air quality objective generally occurred during warm to hot temperatures and with a wind direction from the north (the direction of the industrial estate). Comparing the measurements in Brooklyn with the Footscray monitor indicates the dust problem is localised to surrounding suburbs and, most likely, from local sources.

In late autumn and winter, low temperatures combined with low winds can produce poor dispersion of general urban air pollution. Urban pollutants are typically from combustion sources, such as motor vehicles, industry and solid-fuel heating.

The build-up of these particles is likely to account for recent exceedances of the national objective at Brooklyn; however, the levels measured in Brooklyn are still higher than in surrounding areas.

The PM_{10} dust measurements already demonstrate dust levels beyond acceptable standards and the data collected to date has enabled EPA to issue regulatory notices to Brooklyn companies to mitigate dust from their properties.

EPA is sharing the data with local government officers to enable them to take enforcement action when possible.

A complete report will be developed following the completion of the monitoring, and the general findings have been communicated through community meetings.

WHAT ARE THE NATIONAL STANDARDS?

The air quality objectives are specified in the State environment protection policy (SEPP) for the air environment, which has been adopted from the national standards – the *National Environment Protection (Ambient Air Quality) Measures* (NEPM). The air quality objective for PM_{10} is 50 micrograms per cubic meter ($\mu g/m^3$), averaged over 24 hours.

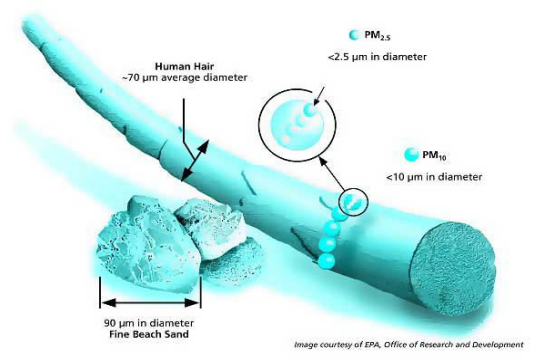
WHAT IS DUST?

Dust, or particulate matter (PM), can come from a number of different sources, including industry, motor vehicles, domestic wood heaters, waste burning and general windblown dust.

It is usually categorised into coarse particles (those found near unsealed roadways and dusty industries) and fine particles (such as those in smoke and haze).

Coarse particles are bigger and tend to deposit closer to the source, whereas fine particles can be carried a long way, especially on a windy day.

Dust with particles that have a diameter of less than 10 micrometres (one micrometre is 1/1000 of a millimetre) is called PM_{10}. Particles of this size, are less than one-tenth the diameter of a hair and if breathed in, are small enough to make their way into the lungs, affecting human health.



Depending on a range of factors, including degree of exposure and existing health, PM_{10} dust can aggravate existing respiratory and cardiovascular disease, decrease lung function, exacerbate asthma and alter the body's defence and lung-clearance mechanisms.

Those most sensitive to PM_{10} dust include the elderly, children and people with existing respiratory or cardiovascular disease.

FREQUENTLY ASKED QUESTIONS

What can I do if I am concerned about dust and my health?

The Department of Health provides the following advice.

On predicted high dust days, the following precautions can help you protect yourself and your family against adverse effects of airborne dust:

- Avoid outdoor activity. If you must go outside, spend as little time outside as possible.
- Avoid vigorous exercise, especially if you have asthma or a breathing-related condition.
- Stay indoors, with windows and doors closed.
- Stay in air-conditioned premises if possible and ensure regular maintenance of air conditioner filters.
- If you are an asthmatic or have a respiratory condition and you develop symptoms such as shortness of breath, coughing, wheezing or chest pain, follow your prescribed treatment plan. If symptoms do not settle, seek medical advice.

Why don't you make industry put a dust monitor on their fence?

The data collected by EPA identifies the industrial precinct as a source of dust and has already enabled enforcement action from the information that EPA monitoring has provided. EPA cannot enforce compliance using monitoring data provided by industry, as the sampling may not be quality assured.

However, some forward-thinking occupiers of industrial sites have initiated monitoring to enable improved management of their activities that are known to create dust.

Why don't you monitor on Geelong road?

EPA's monitoring program is wholly designed and aimed at determining the impact of Brooklyn's industry on air quality in surrounding residential areas. Monitoring has not been designed to measure the pollution emanating from vehicles along roadways. Monitoring sites have been purposely located away from the roads to ensure that vehicle pollution does not overly interfere with our understanding of the impacts of industry on residents.

Will the dust monitoring be able to tell which property the dust is coming from?

With so many dust-producing industries adjoining each other, it has been very difficult to pinpoint a single site as the dust origin. The new monitoring station at Sunshine West will enable more comprehensive modelling of dust movement and sources.

How can you tell how far the Brooklyn dust is spreading?

The monitoring data from the Brooklyn and Yarraville sites indicates the dust is spreading relatively evenly in the local suburbs surrounding the industrial estate.

Why is it taking so long to determine the composition and risk assessment?

The conventional scientific methodology used to estimate the composition of the PM_{10} is specialised and involves analysing very small quantities of PM_{10}.

The analysis requires experienced specialist laboratories (located in Victoria and NSW) capable of detecting to very low levels and meeting high scientific standards.

Typical air quality studies involved in determining the composition and general sources of PM_{10} or $PM_{2.5}$ collect samples over one or more years to ensure sufficient data and to account for the seasonal variation of the particle levels and sources over a year.

The determination is also complicated by the same individual elements and species coming from a number of different sources. The laboratories need a large number of samples to make scientifically certain assessments.