Submission No 34

INQUIRY INTO HEALTH IMPACTS OF AIR POLLUTION IN THE SYDNEY BASIN

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Subject:

Summary

SYDNEY BASIN: AIR TOXIC EMISSIONS & HEALTH RISK

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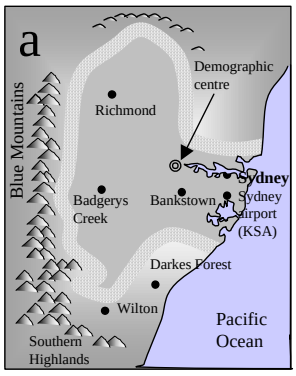
Primary air pollution sources, including Sydney Airport, Port Botany and the Kurnell refinery, are located in the narrow, eastern part of the Sydney Basin, adjacent to the Central Sydney Industrial Area. In densely populated suburbs near, and downwind of, these facilities, and in the western & southwestern part of the Sydney Basin, there is sufficient evidence of a link between air toxic pollution and above-average lung cancer occurrences to warrant concern and action. Figure 1 shows the typical daily cycle of air pollution, for those days when air is trapped inside in the Sydney basin, and illustrates an apparent connection between lung cancer occurrence and air toxic pollution.

Figure 1 [Map drawn after Ref 1]

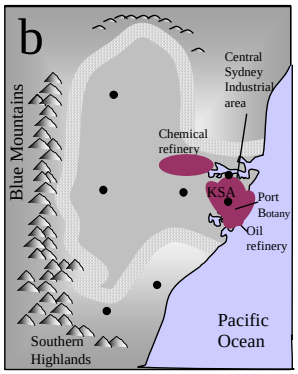
Sydney Basin: trapped air pollution circulation & lung cancer occurrence

SYDNEY: population 4m



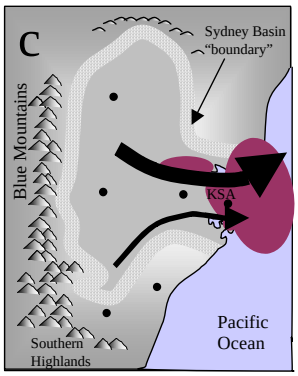
Sydney is in a classic, closed 'smog' basin. Its boundaries are mountains to W & S, high ground to N, and land/ocean temperature differential to the E. The boundary is stippled to indicate the 'slopping' nature of trapped air moving around inside the basin.

PRIMARY POLLUTION SOURCES



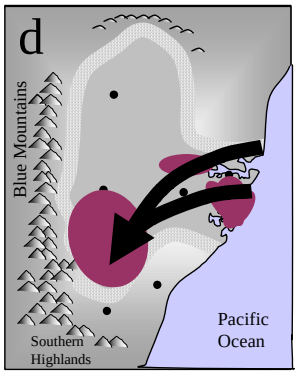
From early morning pollution is generated from primary sources: i.e. the airport, seaport, other industrial sources such as petroleum refinery, chemical works, and basin-wide road traffic.

MID MORNING



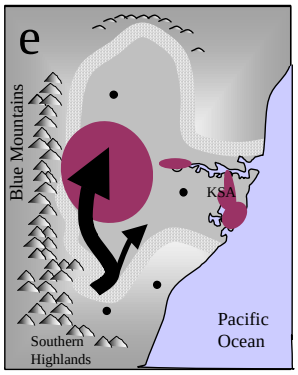
At about 10-11am, the offshore breeze blows morning air pollution about 7-8 km offshore, where it is blocked by the temperature differential between colder sea and warmer land.

AFTERNOON



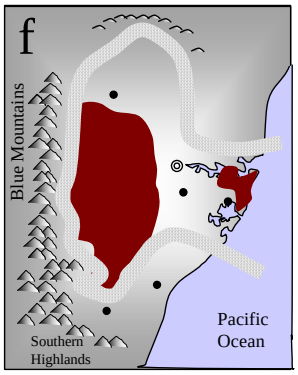
In the afternoon, sea breezes bring the morning pollution back onshore, picking up afternoon emissions along the way, and concentrate it in the south-west corner of the basin. Note the pollution cloud comes back onshore in a different direction because of the coriolis effect.

NIGHT TIME



At night, cold air moving downhill from the south and southwest pushes the main bulk of accumulated pollution north and then east, over the most populous parts of Sydney. Smog may be re-circulated for several days, in a 'figure 8' pattern, until a strong wind flushes out the basin.

LUNG CANCER HOT SPOTS



Dark red depicts areas of lung cancer occurrences that are higher than the NSW average. The pattern corresponds with Sydney's primary pollution source areas in the east and the air toxic pollution trap in the west. *(map after NSW Cancer Council 1991-1995 report)*

The Sydney basin is a classic “closed” basin, bounded by high terrain to the south, west and north, and by temperature differentials between land and ocean on the eastern side. Trapped pollution may accumulate and circulate inside the basin periods of up to several days [1, 2] until a strong wind, such as a “southerly buster” or strong westerlies, flushes ‘dirty’ air out of the basin. Temperature inversions exacerbate the smog trap situation with relative frequency.

Sydney's highest lung cancer occurrences (NSW Cancer Council maps [3]) occur disctinctly in two areas of the Sydney basin, areas that are strongly associated with air toxic pollution; i.e. primary pollution sources in the eastern part of the basin and an air pollution sink area in the western-south western Sydney basin.

Thus road traffic emissions and other transport emissions may contribute in much greater degree to long term human health problems than previously considered.

Government sources frequently state that lung cancer is overwhelmingly the result of smoking, however, I feel that considerably more effort should be made to assess the impact of long-term exposure to air pollution as a contributor to lung cancers, and other respiratory and heart ailments.

Smokers living in areas of high air pollution may be at a higher risk of acquiring lung disease than smokers living in cleaner air environments. However, logically, this argument would also apply to non-smokers. It would be very interesting to be able to map the demographics of habitual cigarette smokers living and working across the Sydney basin, against the patterns of higher than usual lung cancer occurrences and air pollution circulation patterns. Unfortunately, I have not been able to obtain such data.

There is reason to be concerned about the health impacts of air toxic transport emissions, but, to the best of my knowledge, as at August 2001, no formal studies had been conducted for the Sydney basin.

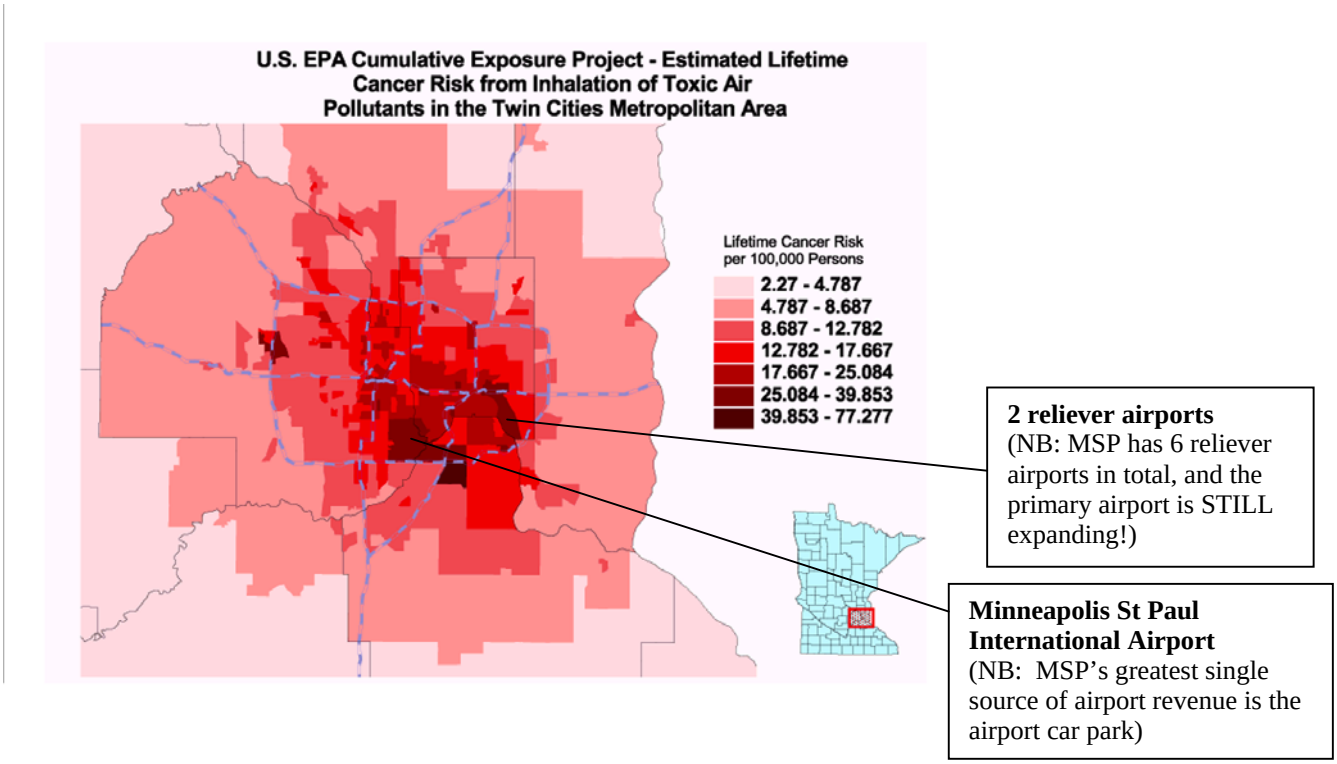
Even allowing for statistical skewing in the population data upon which the cancer occurrence maps are based, areas of above-average lung cancer occurrences in Sydney (Figure 1) show a striking similarity to the mapped patterns of high cancer risk for Seattle [6], Minneapolis St Paul [Figure 2, Ref 5], and Chicago [7]. These studies are in turn supported by the results of other overseas studies [8, 9].

Health risk downwind of Seattle’s SeaTac international airport is a particularly interesting case study because of the relative lack of other industry around the primary airport. Sharon Skolnick of the Earth Island Institute reported that the State of Washington's Health Department Census, which compared 1991-1995 health data for people living near Sea-Tac Airport with those of Seattle residents overall, found that "infant mortality near the airport was 50 percent greater, heart disease was 57 percent greater, cancer deaths were 36 percent greater." For people living near the airport, overall life expectancy was found to be 5.6 years shorter. That is not to say that it has been established that airport-generated pollution was the cause (or more likely one of several causes), but it suggests that far more attention to such a possibility is now warranted.

The US EPA CEP study found [Ref 5] that more than half (53 percent) of the estimated excess cancer risk from all air toxics in the Minneapolis St Paul metropolitan area comes from mobile sources such as cars, trucks, airplanes and off road vehicles.

When comparing Minneapolis St Paul lung cancer risk patterns with actual lung cancer occurrences in the Sydney Metropolitan area, it must be noted that: a) Minneapolis St Paul is located in a relatively open area and therefore air pollutants can be more easily flushed out of the metropolitan area, and b) benzene in Australian petrol (leaded and unleaded) is around 3 times higher than is permitted in the US and the European Union. Likewise, reactive hydrocarbons that are precursors to 1,3 butadiene are also higher in Australian fuels.

Figure 2



There is an extensive array of reputab le studies which link toxic air emissions with ill health. I have referred to just a few, in the following paragraphs.

Negative health implications for children of exposure to air toxics have been summarised by NRDC [10].

Children are particularly vulnerable to air toxic emissions because of their relatively small body size. One study in Britain found that children born near certain industries, near major roads, ports and airports are around 20% more likely to die in childhood from cancer than children born in cleaner air environments [9].

Negative health implications from diesel emissions are well known, and were summarised recently by Dr Peter Fisher, of Gladstone University, Qld. [11]

Premature mortalities in Sydney from exposure to fine particulates are occurring in the order of 400 per annum [12], and asthma is also common. Risk of heart attacks also increases on days of high particulate pollution.

Devra Lee Davis, a professor at Carnegie Mellon University's Heinz School for Public Policy and Management in Pittsburgh, stated that ozone, particulates, carbon dioxide and other pollutants from the combustion of fossil fuels are already public health

hazards. She said "There are more than a thousand studies from 20 countries all showing that you can predict a certain death rate based on the amount of pollution." It has been known for many years, in Sao Paulo, Brazil, that certain types of ill health are closely connected with high levels of air pollution.

Particulates are known to represent a health problem in the Sydney metropolitan area. Exceedences of PM10 fractions have been occurring in inner city suburbs for several years. PM2.5 particles are smaller, and thus are more dangerous. Of particular relevance and concern is that PM2.5 particles which pass through a polluted urban air column may carry or "piggyback" carcinogens deep into human lung tissue, beyond the lung's natural ability to expel them, thus becoming potential sites for future tumours.

In Sydney, a 1998 study of daily hospital admissions and outdoor air pollutants [17] showed that an increase in daily maximum particle concentrations was associated with an increase in hospital admissions for chronic obstructive pulmonary disease and heart disease admissions for older people.

The occurrence of lung cancers, and other such illness, represents calculable costs. The average direct cost for treating a cancer case over time exceeds A$100,000 and is rising [4].

To reduce health risk it is imperative to reduce the amount of air toxic emissions being generated inside the Sydney basin air shed. To date, government policies to reduce Sydney basin air toxic emissions by reducing the numbers of motor vehicles on our roads have not been implemented.

It is relevant to note that funding of public transport has been neglected in favour of constructing privately operated, profit-driven, toll roads, which has worked against efforts to reduce air toxic emissions. Public protest against the coupling of all of Sydney's new toll roads with, arguably, the largest single road traffic generator in the Sydney basin, i.e. Sydney airport, went ignored. The Sydney Airport car park is the airport's single greatest commercial asset, however, it is clear that the intended further expansion of car parking facilities at Sydney airport equates to a further rise in air toxic pollution from that source.

Currently, more than 95% of all access to and from Sydney airport is by road, making it far from world's best practice. World best practice in this regard is represented by airports like Schiphol Amsterdam (around 40% public transport access). Heathrow Airport is reportedly aiming for 50% public transport access.

Airport-related road traffic emissions have been, but should not be, either artfully minimised or excluded from airport emissions calculations, when estimating the health impact of an urban airport's operations on surrounding populations. Total airport emissions should ideally be calculated as if in a "bubble", that is, including aviation emissions, airport-associated road traffic emissions, as well as any other emissions generated from an airport's overall operations. The Natural Resource Defense Council's report "Flying Off Course" reported that major airports tend to rank among the top ten single sources of air pollution in their metropolitan areas, based on aviation emissions alone.

"The Guardian" reported on July 25, 2001 as follows: *"Emissions from aircraft are a growing contributor to climate change,"* admits a recent government consultation paper

on the future of British aviation. At the same time, the paper goes on, *"The effect of emissions from aircraft...is less than that of road traffic to and from airports."*

In Sydney, the numbers, average size, weight and age of motor vehicles is rising, outstripping gains made by improvements in fuel quality [13]. Similarly, aircraft numbers have risen very rapidly indeed, and older aircraft have been kept in service longer than originally intended, outstripping gains made by reductions in individual aircraft engine noise. [14]

State and Federal government studies of health impacts of urban air pollution have been limited to the effects of carbon monoxide, nitrogen dioxide, ozone, sulphur dioxide, lead and particulates. However, the health implications from long-term exposure to specific carcinogens and toxics issuing from airport operations, marine port operations and other industrial activities, such as benzene, 1,3 butadiene, formaldehyde, and arsenic, have not been assessed across the Sydney basin in any meaningful way.

Sydney Airport Corporation Limited (SACL) recently claimed that emissions from Sydney airport have not increased significantly since 1992 (a surprising finding, given there has been a one-third increase in aircraft traffic and an even greater increase in motor vehicle traffic to and from the airport during that period of time). SACL furthermore claimed that the emissions measured at their two monitors -- one at Sydney airport and the other at Botany -- do not represent a significant health risk to surrounding residents [15]. These conclusions were based on limited data and failed to measure specific carcinogens or consider health implications of long-term exposure to such carcinogens and other toxics, and may also have ignored exceedences of PM10 fractions. It was a case of finding no problem by hiding behind commercially convenient but worthless (i.e. to public health) guidelines, and by ignoring proper research.

There has been no formal cost/benefit analysis of the health costs arising from the expansion of the Sydney basin's airports, versus the scenario of a healthier and arguably more productive population (that could be realised by relocating Sydney's primary airport to a more suitable location just outside the smog basin, e.g. Wilton, and connected back to the Sydney metropolitan area and its various business district areas by frequent, well-integrated, and reliable rail & bus services). Replacement airports have been quite successfully realised in Denver, Hong Kong, Munich, Kuala Lumpur, Oslo and Athens). Europeans envy the relative abundance of 'open' space that is available to Sydney and probably don't understand why a supposedly sophisticated city like Sydney has not yet developed a very good public transport system.

One possible reason why ill health from long-term exposure to toxic transport emissions has been ignored by some economists and most transport planners, may be because increasing ill health contributes positively when using conventional measures of economic growth. There is an urgent need for project evaluations to become more holistic and realistic, i.e. to distinguish "good" from "bad" economic growth.

NSW must radically introduce the concept of long-term planning for transport infrastructure (airports and land transport) so that land-use conflicts such as those that are increasingly affecting Sydney may be avoided, or at least minimised, in the future.

It is important to ensure that long-term economic, social and environmental sustainability are adopted as fundamental components of long-term transport planning and urban planning. It is totally unacceptable that NSW has no long term plans and,

even worse, in the last 12 months, certain NSW state ministers have openly expressed a disregard for planning in general.

Comprehensive, formal studies are urgently required to clarify the degree to which cancer occurrence and risk, is due to toxic air emissions, and to establish what actions to take for sensible precautionary measures to be taken in future urban planning and transport development

Health warning labels, similar to those appearing on Californian petrol bowsers should be affixed to all Australian petrol bowsers so as to inform citizens about the carcinogenic content of Australian fuels and potential health risk. (Benzene in Californian fuel may not exceed 1%, benzene is much higher in Australian fuels)

Just as tobacco and asbestos industries are being forced to compensate for ill health caused by their products, the aviation industry and other private transport industries, cannot expect to be exempted forever from paying a share of human health problems caused by long-term exposure to air toxic emissions generated by their operations.

In the absence of government intervention to protect human health from excessive, and rising, toxic emissions, a dollar per kilogram value could be placed on a list of known carcinogens and toxics, and polluters charged accordingly. For example toxic emissions charge levied at every parking station and road toll gate, as well as on Sydney metropolitan area RTA registration renewals, may well encourage people to get out of their cars, particularly for the journey to work, and onto (improved) public transport.

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