

YRA Bio-aerosols emissions questions 20 February 2018

Response provided by David Wainwright, Director Air Quality Sciences, Department of Environment and Science.

The report was taken on Thursday the 26th of November 2015, why did it take two years to release in October 2017?

Timelines:

- a) Sampling conducted on 26 November 2015
- b) Initial consultant draft report received 4 January 2016
- c) Draft consultant report after internal review received 3 May 2016
- d) DISITI draft report 16 July 2016
- e) Final DES Report completed and approved for release October 2017

The process was delayed after the DISITI draft report was prepared due to review process and the original author having left the Air Quality Sciences Group. Further clarification was also required from the consultant who was overseas at the time.

(1) And who is JJSC Consulting?

JJSC Consulting

Dr James Smith has over 32 yrs. experience in environmental microbiological and chemical monitoring, research, and associated technology development. He completed his BSc (microbiology, minor-analytical chemistry) at California State Univ. Long Beach (1988) and PhD in microbiology from Montana State University (1995.)

Dr Smith has worked on applied water, bioaerosol and materials fouling microbiology issues in the US, Antarctica, Sweden, Brazil, New Zealand and Australia. He has held positions as owner, quality assurance and research manager of an analytical and consulting microbiology laboratory, OECD research fellow (NZ), and as a university academic and visiting Professor in applied, environmental and food microbiology and environmental chemistry. Project areas include specialized/atypical water microbiological analyses, bioaerosol dispersal and monitoring, risk assessment, analytical technology development and validation, materials biofouling, quality assurance, applied biogeochemistry and laboratory operations. He has performed over 650 inspections over 15 years for biological fouling of built environments, as well as sampling, identification and quantification of bioaerosols. Dr Smith currently resides in Brisbane, Australia and is a consultant and expert witness in water, air quality/bioaerosols, laboratory operations and quality systems, data interpretation, applied environmental microbiology and chemistry and associated environmental management. He is a member of the Standards Australia FT-020 Water Microbiology committee, and is a laboratory technical assessor for the National Association of Testing Authorities (NATA), International Accreditation New Zealand (IANZ) and Papua New Guinea Laboratory Accreditation Service (PNGLAS) in the areas of; water, environmental and food microbiology and chemistry including; bioaerosols, ecotoxicology, mutagenicity, cytotoxicity, cyanotoxin, virus', sampling, measurement uncertainty, molecular biological applications in microbiological testing, and non-standard microbiological analyses. He is also Chief Technical Advisor to Proficiency Testing Australia (PTA) on *Giardia* and *Cryptosporidium* proficiency testing; aquatic biology member of the NATA Biological Testing Accreditation Advisory Committee (BTAAC) and member of the Healthy Waterways-Microbial risk assessment and (policy) management scientific expert panel. Dr Smith is certified in

ISO14001 environmental management systems auditing and is a member of the Australian and New Zealand Societies for Microbiology (ASM, NZMS), Clean Air Society of Australian and New Zealand (CASANZ) and the Australian Water Association (AWA).

<http://staff.qut.edu.au/staff/smithij/>

https://www.researchgate.net/profile/James_Smith47

(2) Do you consider seven tests lasting for 10 to 15 minutes (at a height of 1.5M) on one day of the year to be an adequate reflection of the extent of bio-aerosols being released from the Phoenix composting operation? Taking into account that three of the seven sites (sites 2-6-7) were not down wind of the test area, and that the company may use different compost materials at different times of the year during different weather conditions i.e. are some bio-aerosols more active in cooler conditions and can they travel further on stronger wind currents?

Within budgetary and logistical constraints the assessment provide a snapshot of bioaerosol emissions during normal (i.e. pile turning and mixing) activities and moderate wind speeds. On-site compost turning activity was observed from site 4 at the target site during the period of sampling.

Comprehensive seasonal and on-site material processing assessment was beyond the time-line and budget of the investigation.

As per the JJSC report three agar samples and a spore count was collected at each of the seven locations. This is 28 samples, in addition to particulate monitoring.

As discussed in the meeting 20 February 2018, 10 minutes for agar samples is standard practice to ensure accurate counting of bacterial colonies (i.e. colonies do not grow over each other).

Sampling locations were chosen prior to conducting the study after a scoping visit conducted by JJSC previously to view the topography of the area and organise access (including access to the then bushland site to the west of Phoenix). A transect with the subject site (Phoenix) located approximately in the middle was chosen. Transects are a common sample method in scientific studies to reduce bias, upwind locations are also utilised in many studies including odour determinations to determine background air quality and source of downwind effects. As can be seen in figure 5 of the JJSC report sites 2, 6 and 7 show lower bioaerosols than other sites which indicates some impact from the composting operation occurred at the other sites. The report then assesses if there are any health impacts likely at the measured levels.

The findings that maximum bioaerosol levels were well below the guideline values during normal operations at downwind sites (approximately less than 10% of the guideline) means there are insufficient grounds for environmental harm which may have been a trigger for requesting the composting facility fund further monitoring.

Due to costs and limited number of consultants with bioaerosol expertise, DES does not believe further monitoring at taxpayer expense is warranted unless there is a material change in Phoenix operations.

(3) why were the tests conducted on Yatala's bin collection day ? Did this influence results? Would an expert company not explore this variable before commencing tests?

Despite prior scoping of monitoring locations, JJSC and the accompanying officer did not consider bin collection day as a factor, primarily because six of the seven sites were either industrial or bushland and as a result is unlikely to influence results. Site 7 was the final site of the day when bins were noted on the roadside, no collection was occurring at the time. The bins were closed and unlikely to significantly affect results however, have been noted in the JJSC study on page 14 as a potential source of elevated gram negative bacteria.

The indicators of composting emissions are *aspergillus fumigatus* and thermophilic actinomycetes, levels of gram-negative bacteria in the absence of corresponding *aspergillus fumigatus* and thermophilic actinomycetes, indicates another source of gram-negative bacteria.

(4) Can you tell me if air pollution kills people, and are the national air standards in line with the worlds "best practice" standards.

There is robust scientific evidence indicating that exposure to air pollutants can affect human health in a variety of ways, ranging from subtle biochemical and physiological changes to severe illness and death. Studies reporting such effects have been carried out since early last century, when marked increases in mortality and morbidity followed short-term episodes of extremely high levels of air pollution. This and subsequent evidence resulted in the adoption of ambient air quality standards to safeguard the public from the most common and damaging pollutants, especially those derived from the combustion of fossil fuels.

Summary of International Air Quality Standards/Guidelines for PM₁₀ and PM_{2.5}

| Australian and International PM ₁₀ and PM _{2.5} Standards/Guidelines | | | | | | | |
|--|---------------------------|----------------------------------|-------------------|-----------------------------|----------------------------------|-----------------------------|-----------------------------|
| Organisation/Country/Region | Reporting Units | PM ₁₀ | | | PM _{2.5} | | |
| | | Annual Mean µg/m ³ | 24-hour | | Annual Mean µg/m ³ | 24-hour | |
| | | | µg/m ³ | Allowable exceedences /year | | µg/m ³ | Allowable exceedences /year |
| WHO | µg/m ³ at 25°C | 20 ^h | 50 ^{ah} | | 10 ^h | 25 ^{ah} | |
| Australia | µg/m ³ at 0°C | 25 | 50 | (b) | 8 7(2025) ⁱ | 25 20(2025) ⁱ | (b) |
| New Zealand | µg/m ³ at 0°C | 20 ^h | 50 | | | 25 ^h | |
| United States | µg/m ³ at 25°C | - | 150 ^j | 1 | 12 ^j | 35 ^{j,k} | |
| California | µg/m ³ at 25°C | 20 | 50 | | 12 | - | |
| Canada | µg/m ³ at 10°C | - | 120 | | 10 8.8 (2020) | 28 27(2020) | |
| European Union (Inc UK) | µg/m ³ at 20°C | 40 | 50 | 35 | 25 20 (2020) | - | |
| China | µg/m ³ at 25°C | 70 | 150 | | 35 | 75 | |
| Singapore | µg/m ³ at 25°C | 20 | 50 | | 12(2020) | 37.5(2020) | |
| India | µg/m ³ at 25°C | 60 | 100 | | 40 | 60 | |
| | | | | | | | |

a) 99th percentile

b) Exceptional events allowed - means a fire or dust occurrence that adversely affects air quality at a particular location, and causes

j) averaged over 3 years

k) 98th percentile

h) Guideline value

Note: to convert µg/m³ at 25°C to µg/m³ at 0°C multiply by 1.09

Note: to convert µg/m³ at 20°C to µg/m³ at 0°C multiply by 1.07

Note: to convert µg/m³ at 10°C to µg/m³ at 0°C multiply by 1.04

(5) Why does the report recommend a buffer of 250m when in all other states of Australia they range from 1000m to 2000m ? Why is Queensland prepared to take these risks when other states clearly don't.

The report states that bioaerosols were elevated above background levels within approximately 180-350 m of the approximate target site centre. The report does not specifically state that '250m is adequate as a buffer zone' instead it says that the one day of sampling results are generally consistent with the majority of observations from other studies within QLD and internationally wherein compost-associated and emitted bioaerosol levels decline to background levels within 250-500 m of source and the UK Environment Agency recommendations regarding a 250m buffer zone.

QLD policy RE buffer distances: <https://www.ehp.qld.gov.au/assets/documents/regulation/pr-gl-open-windrow-composting.pdf> can be accessed through the Government website at www.qld.gov.au. At present these are determined on a case by case basis.

On Page 98 of the Fewkes report it states that some bioaerosols can travel as far as 3klm.

Does the government dispute this?

The JJSC study is not denying that they can, but that they are unlikely to be present at levels that can affect human health at these distances.

(6) On page 108 Fewkes states based on the evidence “green waste buffer zones should be 2klm. Why does the report conducted over a one day period conclude that 250m is adequate?

The Fewkes study was conducted at Swanbank, Ipswich which contains a range of composting and landfill facilities on a much larger scale than the Yatala facility.

(7) The general recommendations on the Fewkes report is a standard operating procedure for monitoring emissions and bioaerosol indicators along with a 2klm buffer zone, but it seems the DEHP is prepared to hang it's hat on a one day test where 3 of the 7 samplers were not even positioned in the correct location. Does the DEHP stand by the report issued in October 2017?

Fewkes is not an official report and also the findings/conclusions have not been reviewed by health experts. Rather it is a research Masters thesis expressing the views of researchers only. It is unusual for government to adopt research findings and recommendations from a single thesis wholesale as regulation/guidelines, in the absence of appropriate review and regulatory impact processes.

Sites were positioned as logistically feasible (i.e. not in the middle of a road) based on prechosen locations to provide a mix of both upwind and downwind sampling locations from the composting site.