

**Before Independent Commissioners Appointed by the Canterbury Regional
Council and Selwyn District Council**

In the matter of The Resource Management Act 1991

And

In the matter of Applications by **Fulton Hogan Limited** for all
resource consents necessary to establish, operate,
maintain and close an aggregate quarry (**Roydon
Quarry**) between Curraghs, Dawsons, Maddisons
and Jones Roads, Templeton

**SUPPLEMENTARY REBUTTAL EVIDENCE OF AUDREY WAGENAAR
ON BEHALF OF FULTON HOGAN LIMITED**

LOUISE WICKHAM EVIDENCE

DATED: 5 NOVEMBER 2019

Counsel Acting: David Caldwell

Email: david.caldwell@bridgesidechambers.co.nz

Telephone: 64 21 221 4113

P O Box 3180

Christchurch 8013

Introduction

1. My full name is Audrey Kathleen Wagenaar. I am an Associate and a Senior Environmental Scientist at Golder Associates Ltd.
2. I have previously provided a written brief of evidence in relation to the Roydon Quarry Proposal. That evidence is dated 23 September 2019. I confirm my qualifications and experience as set out in paragraphs 5 to 15 of that evidence.
3. I also confirm I have read and agree to comply with those parts of the Environment Court Practice Note that bear on my role as an expert witness, in accordance with paragraph 7 of my earlier evidence.

Scope

4. My supplementary rebuttal evidence addresses human health issues raised in the evidence filed by Louise Wickham on behalf of Canterbury District Health Board. In particular, my evidence is complementary to that of Mr Roger Cudmore.

Evidence of Ms Wickham

5. In paragraph 106 of Ms Wickham's evidence she indicates that "Good practice guidance in New Zealand does not typically recommend the use of TCEQ air quality criteria" and she refers to Section 4.6 of MfE (2016) Good Practice Guide for Assessing and Managing Dust.
6. Section 4.6 of MfE (2016) states the following regarding the use of TCEQ air quality criteria:

"The 'Texas effects screening levels' are screening levels used in the Texas Commission for Environmental Quality's air permitting process. Some of the Texas effects screening levels have been derived in a transparent manner from toxicological data and are supported by appropriate documentation, and these are appropriate for screening assessments. However, the derivation and basis of some of the screening levels is unclear and where supporting documentation is not available, the use of these criteria is not recommended."

7. I agree with the text above and acknowledge that some of the older air screening levels derived by the Texas Commission for Environmental

Quality's air permitting do not have supporting documentation and they would typically not be used for screening purposes. However, as indicated above, the criteria need to be evaluated on a chemical-specific basis and if there is suitable documentation available, the criteria from TCEQ can be utilized for screening. The proposed 1-hour criteria from TCEQ¹ for respirable crystalline silica does have detailed supporting information and has been peer reviewed.

8. As Ms Wickham indicates, the proposed 1-hour criterion from TCEQ is for respirable crystalline silica less than 10 µm in diameter. The TCEQ 1-hour criterion is derived from studies in laboratory animals (rats) who were exposed to crystalline silica less than 10 µm. There are slightly different definitions of respirable crystalline silica depending on whether it is an occupational (less than PM₄) or an environmental (less than PM₁₀) context (e.g. the measurements of respirable crystalline silica are conducted differently). That being said, the use of a respirable crystalline silica screening value based on a respirable fraction of less than 10 µm is a reasonable and health protective approach and more toxicologically sound than applying an arbitrary factor to a workplace standard.
9. Ms Wickham proposes to use an approach related to worker exposure limits. However, it is noted that Section 4.6 of the MfE (2016)² guidance indicates the following:

“For some contaminants, and in the absence of any other guidance, the New Zealand Workplace Exposure Standards Time Weighted Average (TWA) can be amended for use as assessment criteria.”
10. The text goes on to indicate specific factors (50 for low and moderately toxic substances and 100 for highly toxic bioaccumulative or carcinogenic substances) that can be used to adjust the worker exposure standards to create a value that can be compared to 1-hr air quality monitoring results.
11. Section 4.6 also indicates “Assessment of contaminants for which there are no readily available guidelines should only be undertaken by experienced air quality practitioners. It requires a thorough understanding of the toxicity of the contaminant(s) in question.” Ms Wickham indicates that she is not “a

¹ Texas Commission on Environmental Quality. 2013. Silica, Crystalline Forms. Development Support Document, Office of the Executive Director, TCEQ. Austin, TX, USA. Available on-line at: <https://pdfs.semanticscholar.org/ece9/faeb548758c13a585e94f967656a6123f990.pdf>.

² Ministry for the Environment (MfE), 2016. Good Practise for Assessing Discharges to Air from Industry. Available on-line at: <https://www.mfe.govt.nz/sites/default/files/media/Air/good-practice-guide-industry.pdf>

toxicologist but this criterion seems at odds with workplace exposure for respirable silica PM₄ currently under consideration in New Zealand and Australia (50 and 20 µg/m³ as an 8-hour average respectively)".

12. I would disagree with Ms Wickham with respect to her concern for the ratio of a 1-hour to 8-hour criteria, we generally see a decrease in air quality screening criteria from annual to 24-hour to 1-hour. Typically, 1-hour values are higher than 24-hour values (or in this case an 8-hour value). In turn, both 1-hour and 24-hour values are typically higher than the annual value.
13. If I understand Ms Wickham's proposed approach correctly (based on information provided in Appendix C of her statement), she suggests that the proposed Australian and New Zealand Workplace 8-hour exposure standards would be divided by 100 to generate a range of 1-hour criteria of 0.2 to 0.5 µg/m³, respectively. In my experience it is very unusual to see 1-hour values (0.2 to 0.5 µg/m³) that are less than the annual value (3 µg/m³).
14. I have some concerns with the use of an occupational exposure standard and a generic modifying factor to generate an air quality criteria protective of human health, particularly when a chemical specific criterion is available. Occupational standards are not intended to protect the public. Occupational standards can only be applied in a workplace and when a person:
 - (a) is aware that they are being exposed to a particular substance;
 - (b) has had training with respect to how to minimize exposure; and
 - (c) have access to the appropriate personal protective equipment to mitigate exposure.
15. Occupational standards are generally protective of the working population (generally an active, healthy subset of the population) but may not be protective of all members of the workforce (and by extension all members of the general public such as sensitive subpopulations).
16. The toxicological basis for the derivation of an ambient air quality guideline protective of an acute exposure for the general public may be different than that used to protect workers. For example, a short-term exposure duration based on a non-carcinogenic endpoint would be the preferred study for the derivation of an acute ambient air quality guideline while a chronic or repeated dose exposure in a worker population (based on either a carcinogenic or non-carcinogenic endpoint as appropriate for a particular

substance) would be more appropriate for the derivation of occupational time-weighted average standard. Additional uncertainty factors will also be applied to the derivation of an ambient air quality guideline (where receptors are exposed in a passive manner and may be unaware that the exposure is occurring) relative to the occupational time-weighted average because the workers have an awareness of their exposure and are able to use personal protective equipment to mitigate the exposure.

17. As noted in the MfE (2016) guidance, the application of a modifying factor to a workplace exposure standard is a last resort, if no other criteria are available. The application of a generic modifying factor to a workplace exposure standard is not a typical best practise in human health toxicology or health risk assessment.
18. As Ms Wickham indicates, the proposed 1-hour criterion from TCEQ is for respirable crystalline silica less than 10 µm in diameter. The TCEQ 1-hour criterion is derived from studies in laboratory animals (rats) who were exposed to crystalline silica less than 10 µm. There are slightly different definitions of respirable crystalline silica depending on whether it is an occupational (less than PM₄) or an environmental (less than PM₁₀) context (e.g. the measurements of respirable crystalline silica are conducted differently). That being said, the use of a respirable crystalline silica screening value based on a respirable fraction of less than 10 µm based on an environmental (e.g. laboratory animal) study is a reasonable and health protective approach. It is also a more toxicologically sound approach (e.g., chemical-specific) than applying a default or generic modifying factor to a workplace exposure standard.
19. My evaluation of the text in Section 4.6 of the MfE Guidelines would be that if a robust criterion is available from TCEQ with suitable documentation, this would be a preferred approach over the modification of a New Zealand Workplace Exposure Standard. This would also be consistent with international best practise. In my opinion, Section 4.6 supports the selection of the 1-hour TCEQ value for respirable crystalline silica.

Audrey Wagenaar

5 November 2019