

TABLED AT HEARING

Application: Road Metals

joint hearing

Date: 3 April 2018

In the matter of the Resource Management Act 1991

And

In the matter of an application for Resource Consents by Road Metals Company Limited to extend quarry operations onto adjoining land and operate an aggregate processing activity.

**STATEMENT OF REBUTTAL EVIDENCE OF
RICHARD LESLIE CHILTON
FOR ROAD METALS COMPANY LIMITED**

3 April 2018

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INTRODUCTION

- 1 My name is Richard Leslie Chilton.
- 2 I hold the position of General Manager – Christchurch and Principal Air Quality Scientist at Golder Associates (NZ) Limited (Golder), a ground engineering and environmental consulting firm. I have been employed by Golder since January 2006 and have more than 18 years of experience in air quality management.
- 3 I have been asked by Road Metals Company Limited to comment on the evidence of Dr Kelvin Duncan on matters relating to air quality impacts. Dr Duncan has been engaged by the submitters Mr and Mrs McDonagh.
- 4 I have read the Expert Witness Code of Conduct set out in the Environment Court Practice Note 2014. I have complied with the code in preparing this evidence and I agree to comply with it while giving oral evidence. Except where I state that I am relying on the evidence of another person, this written evidence is within my area of expertise. I have not omitted to consider material facts known to me that might alter or detract from the opinions expressed in this evidence.

OVERVIEW OF EVIDENCE

- 5 Dr Duncan is primarily concerned with the potential adverse effects of respirable crystalline silica (RCS). Much of Dr Duncan's evidence has focused on the possible human health outcomes resulting from exposure to RCS. While I do not purport to be a medical health expert, a key observation I have with the approach of Dr Duncan is his evidence has given very limited consideration to the nature of the proposed quarry activity, how emissions will be controlled/managed, and the likely exposure for neighbours to RCS given the nature of the proposal and prevailing wind conditions.
- 6 In many instances, I found it difficult to corroborate statements in Dr Duncan's evidence as it provided little in the way of supporting references. For example, on Page 3 (paragraph 5) of his evidence he states that "*moderate to light doses over 15 years can cause an 8 to 10 year reduction in life expectancy*". This is an example of a significant statement in my opinion, but it is made without reference to supporting literature or, in this instance, putting into context the quantum of what a 'moderate to light dose' (or exposure) is.

INTERNALISATION OF EFFECTS

- 7 Dr Duncan's evidence states on Page 3 (paragraph 5) that "*most jurisdictions observe the principle of complete containment within the quarry premises.*" In my experience, having worked in the regulatory sector in both the United Kingdom and New Zealand, and drawing

upon the experience of colleagues in other similar jurisdictions (USA, Canada, Australia), this is not the case. Instead, the approach that I am familiar with various jurisdictions adopting is the internalising of 'significant adverse effects'. This recognises that it is often not feasible to completely contain emission from activities such as quarries.

SOURCES OF RCS AND MONITORING BY K2 ENVIRONMENTAL

- 8 Dr Duncan's evidence identifies what he considers to be the activities that can generate RCS emissions associated with a quarry activity and specifically identifies those that he considers are associated with this proposal. Of note is that he highlights 'crushing and conveying' and 'cutting or grinding'. As noted in my evidence in chief, these activities will not occur on the proposed quarry site.
- 9 On pages 4 and 5 of his evidence, Dr Duncan's evidence refers to a report prepared by K2 Environmental, dated 8 November 2016. I have reviewed the K2 report and I note:
- 9.1 There are a number of calculation errors in the report, and in other aspects a lack of clarity on how certain values are determined.
- 9.2 The analysis is of a bulk sample of dust collected from surfaces, rather than being derived from standard air quality monitoring instruments. This limitation appears to be acknowledged by K2 Environmental, as it recommends an ambient monitoring programme to determine if the dust and its crystalline silica content is a potential health issue.

REFERENCE TO VARIOUS PUBLISHED DOCUMENTS REGARDING RCS

- 10 Dr Duncan discusses (paragraph 15, page 5) the potential health effects from exposure to 'silica containing dust' and that "*one of the very many scientific papers on the adverse health effects of RCS is given by Dominici et al (JAMA, 295:1127-1134. 2006)*". I have checked this paper, and while it deals with fine particulate matter, particularly PM_{2.5}, I can find no reference to silica, respirable crystalline silica, or quartz.
- 11 Dr Duncan (paragraph 17, page 6) refers to a 'statement' prepared by the American Thoracic Society (1997) where he notes that the statement "*covers non-occupational exposure, which they see as a serious risk...*". I have read this paper¹ and I note that in the section of the statement under 'Domestic and Environmental Exposure' it states the following (underlined text my emphasis):

¹ American Journal of Respiratory and Critical Care Medicine VOL 155 1997

Individuals may also come into contact with respirable crystalline silica from domestic or environmental exposures even when they do not work in a dusty trade. Although pulmonary silicosis usually requires exposure to high dust levels for prolonged periods, public concern may be raised about potential health effects from brief exposure to airborne silica or residence in locations where prevailing winds carry silica particles from natural or industrial sites. There is little evidence to suggest that brief or casual exposure to low levels of crystalline silica dust produces clinically significant lung disease or other adverse health effects. Chronic simple silicosis has, however, been described after environmental exposures to silica in regions where soil silica content is high and dust storms are common. Mild mixed dust pneumoconiosis without silicotic nodules has also been reported in agricultural workers.

- 12 I note that the neighbours are not downwind of the proposed quarry site, under prevailing wind conditions. Furthermore, the measures proposed for controlling emissions from the site are aimed at limiting effects to those that are less than minor.

STANDARDS AND GUIDELINES FOR RCS

- 13 Dr Duncan (page 11, paragraph 36) makes reference to various jurisdictions' permitted exposure levels for dust and RCS. This includes a number of US states, India and Australia. As noted in my Evidence in Chief, the use of the Californian guideline is recommended by the Ministry for the Environment.
- 14 Dr Duncan discusses (page 13, paragraph 38) mitigating the risk of RCS exposure and that the discharges should be contained within the quarry property. It is my understanding that the RMA does not require containment of discharges, but rather that significant adverse effects be controlled. Leading on from this discussion, the only mitigation that Dr Duncan puts forward is separating the public and residences from the quarry as far as possible – noting the challenges with this approach in a New Zealand context. From my reading of Dr Duncan's evidence, he does not consider the benefit of the suite of mitigation measures that I have recommended, which have the express purpose of minimising exposure to air quality impacts of the proposed quarry operation (including dust and RCS).

SETBACKS

- 15 In paragraph 41 (page 14), Dr Duncan discusses the use of setbacks and how he considers they should be applied. I have addressed what I consider to be the appropriate application of separation distance criteria in my evidence in chief, and Ms Simpson succinctly describes the manner in which separation distances are applied. A key point is that a separation distance should be applied from the source of the emission to the sensitive receptor location, and not - as Dr Duncan suggests - from the source to the property boundary of the site.

- 16 In paragraph 42 (page 15), Dr Duncan sets out what he considers to be criteria concentrations for mining and extractive industries for PM₁₀, PM_{2.5} and RCS, setting out guidance for the Australian state of Victoria. These values are higher than I would consider appropriate in New Zealand. Dr Duncan's evidence goes on to estimate permitted exposure limits (PEL) for RCS based on USA state guidance and his understanding of the RCS content of Greywacke rock. This is incorrect as respirable particulate matter measured over the course of a year will not solely be composed of Greywacke rock dust, meaning that the resulting 'whole dust PEL' are likely to be unrealistically conservative.

APPLICATION OF AIR QUALITY INDICES

- 17 In paragraphs 43 to 48 (pages 17 to 19), Dr Duncan works through the application of US EPA air quality indices (AQI) for PM_{2.5} and its application to RCS. My overall comment regarding this is that Dr Duncan's application of the AQIs and subsequent analysis is fundamentally flawed. Firstly, AQIs are intended to convey the state of ambient (outdoor) air quality in a meaningful way for the public in large urban centres. They are not intended to be applied to indoor air quality or to isolated industrial situations. Furthermore, the AQIs for PM₁₀ or PM_{2.5} relate to 24-hour average data whereas it is my view that the data used by Dr Duncan is likely to relate to a shorter time-period as I will explain.
- 18 The data presented in the table at the bottom of Page 18 in Dr Duncan's evidence reports 'inhalable dust' (PM₁₀) concentrations measured from personal exposure monitors from eight different samples worn by residences in the Yaldhurst area. According to Dr Duncan's evidence the measurements were made indoors and gave concentrations between 207 and 822 µg/m³, although no information is made regarding the reported averaging period. In my experience, these are extraordinarily high 24-hour average concentrations, and if they were to occur then I would agree that they are unhealthy as they are several times higher than the National Environmental Standard for PM₁₀ (50 µg/m³ as a 24-hour average). Indoor air pollutant concentrations within homes is often much higher than the outdoor air quality for a variety of reasons – this is frequently documented in indoor air quality studies that I have read. However, I am very doubtful that the results are representative of a 24-hour average, and consider them more likely to be the results of short-term instrument reading. Furthermore, the results are contrary to the PM₁₀ data from the current monitoring programme, which do not show 24-hour average PM₁₀ concentrations of this magnitude.
- 19 The table presented on Page 19 similarly presents Dr Duncan's analysis for PM_{2.5}. While the numbers appear more realistic (with the exception of one reported concentration of 622 µg/m³), I suspect that the results are for an 8-hour averaging period rather than the 24-hour average required for the AQI calculation. Given that 24-hour average concentrations will be lower than for a shorter averaging period, the results of the calculation are likely to be overstated.

- 20 In paragraph 48, Dr Duncan attempts to apply a calculation to determine whether concentrations would exceed a permissible exposure limit of RCS, based on the fraction of RCS in greywacke dust and the results of the personal exposure monitors. This approach fundamentally overlooks the fact that the relevant exposure guidelines for RCS are expressed as an annual average, and therefore you cannot apply short term personal exposure monitoring data where the sampling time is in the order of 8-hour in the manner that has been done by Dr Duncan and draw the conclusions that he has.

CONCLUSION

- 21 In conclusion, it is my opinion that Dr Duncan's evidence highlights what the effects of RCS can be without realistically establishing what the risk of exposure is for the neighbours of this proposed quarry.



Richard Chilton
Principal Air Quality Scientist

3 April 2018