BEFORE THE COMMISSIONER APPOINTED BY:

OTAGO REGIONAL COUNCIL

AND

CENTRAL OTAGO DISTRICT COUNCIL

In the Matter	of applications by Cromwell Certified Concrete Limited to the Otago Regional Council and Central Otago District Council for discharge permits, a water permit and a land use consent relating to expansion of an existing quarry at 1248 Luggate-Cromwell Road
Between	**CROMWELL CERTIFIED CONCRETE LIMITED**

BRIEF OF EVIDENCE OF DONOVAN VAN KEKEM FOR OTAGO REGIONAL COUNCIL

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1. Introduction

1. My name is Donovan Van Kekem. I am the managing director of NZ Air Limited (NZ Air). I have over 17 years specialist air quality experience. I have been engaged by Otago Regional Council (ORC) to act as an independent air quality expert peer reviewer of the Cromwell Certified Concrete (CCC, the applicant) Amisfield Quarry expansion application for an air discharge consent.

2. Qualifications and Experience

2. I have the following qualifications:

    1) a Bachelor's Degree in Biochemistry from the University of Canterbury; and

    2) a Post Graduate Diploma in Forensic Science from the University of Auckland.

3. I am a current member of the Clean Air Society of Australia and New Zealand and am a Certified Air Quality Professional.

4. Some of my work experience which is relevant to this application is as follows:

    1) I have been involved in writing and presenting expert air quality evidence for a number of air discharge consents containing nuisance dust discharges including:

        (i) The proposed Fulton Hogan Fairlight Quarry on behalf of Fulton Hogan.

        (ii) The proposed Taggart Earthmoving Rangiora Racecourse Quarry on behalf of submitters (Rangiora Ashley Community Board).

        (iii) The SOL Quarries Harewood gravel quarry on behalf of SOL Quarries.

(iv) AB Lime Winton Quarry and Landfill, replacement air discharge consents for its landfill and lime kilns on behalf of Fulton Hogan.

(v) Envirofert's application for a replacement air discharge consent for its composting operation in Tuakau.

2) I have also acted as an independent processing officer for Canterbury Regional Council (CRC) assessing a number of complex air discharge consent applications, a number of which have gone through to hearing at which I have attended as an air quality expert on behalf of CRC.

3) I have conducted air quality monitoring and/or assessments at number of quarries and mines including:

(i) Brookby Quarry, Auckland;

(ii) Winstone Aggregates Belmont Quarry, Wellington;

(iii) Christchurch Readymix Amberley Quarry;

(iv) Winstone Aggregates Hunua Quarry, Auckland;

(v) Anglo American – Callide Coal Mine;

(vi) Xstrata – Rolleston Coal Mine; and

(vii) Sumitomo Mining and Metals proposed Solomon Islands nickel mine.

3. Code of Conduct

5. Although not necessary in respect of council hearings, I can confirm I have read the Expert Witness Code of Conduct set out in the Environment Court's Practice Note 2014. I have complied with the Code of Conduct in preparing this evidence and I agree to comply with it while giving oral evidence before the hearing committee. 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.

4. Scope and Structure of Evidence

6. I have reviewed the following reports:

   a) Beca Report: Amisfield Quarry – *Technical Assessment of Potential Effects of Dust Discharges*. Dated 22 October 2020 (hereafter referred to as the air quality assessment (AQA)).

   b) Beca Letter: *RM20.360.03 Amisfield Quarry Response to Request for Further Information*. Dated 1 March 2021. (hereafter referred to as the s92 response).

   c) Golder Letter: *Review of Dust Effects Assessment – Amisfield Quarry*. Dated 11 November 2021. (hereafter referred to as the Golder Review).

   d) Golder Draft Dust Management Plan – Amisfield Quarry. Dated November 2021.

   e) The 17 submissions made on the consent applications.

7. I was the author of:

   f) NZ Air Letter: *Preliminary technical air quality review of the proposed Cromwell Certified Concrete Quarry air discharge consent application*. Dated 12 January 2021

   g) NZ Air Letter: *Technical air quality review of the Cromwell Certified Concrete Quarry Section 92 response. RM20.360.03*. Dated 12 March 2021

8. The scope of my evidence is limited to providing my expert opinions on the air quality related matters associated with this application.

9. My evidence addresses the following matters:

   1) A summary of my initial review of the Beca AQA and associated s92 response;

2) Comments on the Golder review letter and draft dust management plan (DMP);

3) Response to submissions;

4) Comments on the recommended conditions of consent; and

5) Conclusion.

10. It is not my intention to repeat all of the information that has been provided with the application, but to provide a summary of the key aspects and conclusions of my reviews. I will cover specific elements which are relevant to my area of expertise, the submitters properties, and concerns raised.

11. At the time of writing this evidence I have not been able to visit the site. Therefore, my evidence is based on a desktop assessment only, and therefore has limitations. However, I have arranged a site visit for the 30th November and as such will be in a better position to express my expert opinions at the hearing.

12. I also note that Mr Roger Cudmore of Golder implies that he will be providing further assessment in his evidence. Without having this information in front of me at this stage I am unable to comment on this additional information and therefore reserve the right to alter my opinions once this information is provided.

5. Initial Review of the Beca AQA and s92 Response

13. In my preliminary review[1] of the Beca AQA I identified a number of aspects of the original assessment that needed to be addressed or required clarification. This additional information was requested in a Section 92 request for further information.

14. Much of the identified information gaps were addressed in the subsequent s92 response from Beca.

[1] NZ Air Letter: *Preliminary technical air quality review of the proposed Cromwell Certified Concrete Quarry air discharge consent application*. Dated 12 January 2021

15. Having reviewed all of the technical air quality information presented by Beca I was of the opinion that the proposed activities and associated stringent dust mitigation measures were appropriate for a quarry of this size and nature. Whilst I held residual concerns about the proximity of some of the nearest sensitive receptors (including cropping operations), the level of mitigation proposed (particularly boundary monitoring and cease work conditions) was consistent with industry good practise.

16. Overall, I concluded that the was a low potential for chronic adverse off-site effects if the proposed off-site mitigation was stringently applied.

17. I will not comment further on this initial review as it is my understanding that the Golder review and associated DMP has replaced the Beca assessment and AQMP.

6. Comments on the Golder review letter

18. To be concise I will focus on the area's of the Golder Review where I consider further information is required or that I disagree with.

19. Golder appears to disagree with Beca with regards to the dust particulate size fraction that has the potential to result in adverse off-site effects. Mr Roger Cudmore (the author of the review) considers that the discharge of fine particulates (usually defined as PM_{10} and $PM_{2.5}$) is "*more significant discharge to air*". Mr Cudmore does not support his statement with an evidential basis (i.e. dust monitoring data or research papers). Therefore, I consider that this statement is unsubstantiated and contradictory to the information presented in the current good practice guidance[2] which his is widely used/adopted by air quality professionals across New Zealand.

20. Based on the research papers I have reviewed and my experience with monitoring dust emissions around quarries/mines, the primary size fraction of dust discharged from quarrying activities is that referred to

[2] Ministry for Environment Good Practice Guide for Managing and Assessing Dust (2016) (MfE GPG Dust)

as Total Suspended Particulates (TSP), which are large particulates generally with a diameter of greater than 30 µm. The relative proportion of fine particulates (PM_{10} and $PM_{2.5}$) in the dust discharged is low.

21. I agree with Mr Cudmore that any fine particulate discharged from the quarry will travel much further from the discharge source during elevated windspeeds, however, as such the dispersion of these plumes results in lower concentrations of these plumes at distance from the site.

22. The faster deposition rates of TSP results in the most common adverse off-site effects associated with quarry effects which is the deposition of layers of dust on outdoor exposed surfaces, washing, inside houses when windows are left open, and in this case on surrounding crops.

23. Notwithstanding the above, current research and dust monitoring around quarries does identify that a proportion of the dust discharged will contain PM_{10}. As such, I agree with Mr Cudmore that should the proposed dust mitigation measures fail, there is a potential for off-site adverse health effects from the discharge of fine particulates.

24. This potential health effect will be primarily close to the discharge point, where the plume has not had a chance to effectively disperse. As such, members of the public close to the discharge point will have the highest risk of adverse off-site effects.

25. Mr Cudmore infers that he has quantified the level of fine particulates which may occur beyond the boundary of the site using air dispersion modelling, however this information has not been presented to date, so I cannot comment on this further at this stage.

26. Mr Cudmore also states that the gravels will have a high quartz content (approximately 60%) but does not provide an evidential basis for this (i.e. aggregate composition testing results). The quartz content of the aggregate is important for identifying the potential for off-site respirable crystalline silica (RCS) effects. Therefore, once again I consider that Mr Cudmore should provide the evidential basis for his assertion about the quartz content, particularly if he is going to present a further

assessment of the potential for adverse health effects associated with RCS emissions.

27. Mr Cudmore also presents some wind roses which have been derived from “diagnostic modelling analysis”, however the details of this modelling have not been provided. Therefore, it is difficult to identify how representative this modelling is of the actual wind conditions surrounding the site.

28. Mr Cudmore also considers that the highest potential for adverse effects on adjacent crops will be when fine particulates ‘impact’ on wet crops. I consider that it is less likely that there will be substantive discharges of fine dust directly after periods of rain when the crops are wet, as the material in the quarry is also likely to be wet after the rain and therefore there will be lower potential for dust discharges. Therefore, I disagree that this series of events is likely to result in the highest off-site crop effects. I remain of the opinion that deposition of TSP on the crops has the highest potential for off-site effects.

29. I also disagree with Mr Cudmore’s assertions that the use of water for dust suppression on exposed surfaces and haul roads should be “*used as a contingency*”. In my experience, the use of water is the most effective dust suppression measure in quarries. It is a widely accepted industry best practice dust discharge minimisation measure. Mr Cudmore’s concerns about excessive water application resulting in tracking mud and fine dust off-site are warranted, but this is more a factor of site personnel failing to apply the right amount of water to the site exit road to keep them damp as opposed to flooding them.

30. There are other mitigation measures which are appropriate to prevent/limit material tracking off-site. Some of which are proposed in the updated DMP.

31. Furthermore, I believe that a combination of mitigation measures (with water application being a major component) as is generally outlined in the proposed DMP is most applicable and appropriate.

32. I also disagree with Mr Cudmore's assertion that speed limits for haul trucks are "generally ineffective". It is a widely accepted fact that the faster a vehicle travels on an unsealed road the higher the potential for dust emissions. With increased speed of a vehicle travelling on an unsealed road, there is a stronger vehicle wake effect which increases the disturbance and aerosolisation of fine dust on the surface of the road.

33. Whilst I agree that the application of fresh washed aggregates on the surface of haul roads and exposed surfaces is important to reduce the proportion of surface fines, I consider that this should be used in conjunction with other mitigation measures (including use of water and chemical dust suppressants).

7. Comments on the Golder draft DMP

34. Whilst I agree that bund formation and stripping of topsoils should occur during winter months, I disagree that the full 8 ha of the extension area should be stripped all at one time. I consider that this activity should be staged and that progressive rehabilitation/surface stabilisation should occur as each stage is completed. This staged process is good practice in many quarries across NZ. Leaving a large open area will exacerbate the potential for dust emissions. Leaving the yet to be quarried area grassed will reduce the potential for dust discharges from this source.

35. With regards to the proposed dust monitoring program, I consider that the use of PM_{10} monitoring, as opposed to TSP monitoring, needs to be justified. Whilst I agree that there will be a portion of the dust discharged that will be PM_{10} I consider that it is likely that the larger proportion of the dust which will be measured at the site boundary will be TSP. Therefore, the use of TSP monitoring will be a more effective tool to demonstrating the amount of dust which is leaving the site and therefore providing effective feedback to the site operators as to the effectiveness (or otherwise) of the on-site dust mitigation measures.

36. As discussed above, I consider that TSP discharges are likely to be the primary particulate size fraction in the dust discharges, and are likely to have the highest potential for nuisance effects and/or effects on adjacent cropping operations.

37. However, should Mr Cudmore's more in depth assessment of potential PM_{10}/RCS discharges from the site identify that there is a significant potential for health based off-site effects from PM_{10}/RCS emissions then PM_{10}/RCS monitoring may need to be added to the proposed monitoring program.

38. I also consider that the use of a rolling one hour average for the proposed boundary dust trigger level is too coarse. This may allow for excessive dust emissions to occur for a relatively long period of time before a response occurs from the site. In my opinion it is appropriate to have short term triggers (10 minute average) as well as longer term averages to be able to assess and respond to potential acute and chronic dust effects.

39. I also consider that the proposed minimum mast height for the weather station is too low. The proposed minimum of 4 metres above ground level or the height of the boundary bund is not in accordance with the AS/NZS 3580:14-2014 proposed. In this standard, a minimum mast height of 10 m above ground level is recommended/required. There is also a requirement for the height of wind sensors to be distant from obstructions which could alter airflows (such as bunds, shelter belts, buildings, etc).

40. Windspeed triggers for on-site investigations/stop work conditions are appropriate for a mast height of 10 m. As windspeeds generally decrease with height above ground level (dependent on the surface roughness), what is an appropriate windspeed trigger at 10 m above ground level will not be appropriate at 4 m above ground level.

41. I note that it is proposed that a 20,000L water truck will be used for dust suppression. It would be good for the applicant to confirm that this water truck will have sufficient capacity to apply water to all of the proposed open areas at the maximum application rates anticipated (i.e.

based on peak evapotranspiration rates and area which will require watering).

42. Also, is there a backup watercart available should the current watercart breakdown/need maintenance? Contingencies for critical dust mitigation measures need to be detailed (in greater detail than is included in Section 6.2 of the DMP)

43. I also consider that there needs to be a larger buffer distance (larger than the 50 m proposed) between extraction/dust producing activities (i.e. haul roads) from adjacent sensitive receptors. At this stage, given the uncertainty in the assessment I consider a minimum buffer of 100 m is appropriate. Note that I include adjacent crops as a sensitive receptor (as does Mr Cudmore).

44. As discussed above, I consider that there should be progressive extraction and rehabilitation of the working face. I recommend that no more than two hectares is open at any one time.

8. Comments on Submissions

45. I have read all of the submissions on the notified air discharge consent application. There are a lot of air quality related issues raised in the submissions. To remain concise, I have the following overall comments on these submissions.

46. I agree with the submitters that the use of only nine months of meteorological data in the Beca assessment is limited and that a longer dataset should have been used.

47. Whilst a number of submitters comment that there are a large number of Harvest weather stations in the area, often this data is not publicly available. Furthermore, a number of these stations may not include windspeed or wind direction data (or if they do it is unlikely to be at 10 m above ground level).

48. As such, in the absence of additional representative weather data, I consider that the weather data collected at Fulton Hogan's quarry to be the most representative. However, it would have been pertinent for the

applicant to have installed a weather station at the start of the planning stages of the proposed expansion project such that reliable on-site weather data was available for the assessment.

49. Many of the submissions raise concerns about the potential for adverse dust effects on their crops and associated structures.

50. There does not appear to be any evidence supplied that indicates/proves that the current operations are resulting in adverse effects on crops. However, as adverse effects on crops will be dose responsive the proposed substantive increase in extraction rates (70,000 m^3/annum to 200,000 m^3/annum) may result in a higher potential for dust deposition rates on surrounding crops. Particularly if there are concurrent operations in the existing quarry area and in the expansion area (which would result in potential off-site deposition of particulates in under multiple wind directions).

51. Notwithstanding the above, the potential for dust discharges beyond the boundary of a quarry are less about the scale of the operation and more about the on-site dust mitigation applied. Even a small quarry operation with poor dust mitigation can result in adverse off-site dust effects. Conversely a large quarry using best practice dust mitigation can operate relatively close to sensitive receptors without generating adverse off-site effects.

52. Regardless, I consider that there should be a larger separation distance between the proposed quarry operations and neighbouring dwellings and cropping activities, a minimum of 100 m. In my experience, even with good practice dust mitigation measures in place, there is a residual potential for adverse effects from quarrying operations within 100 m of dust discharge sources (haul roads, material handling activities, etc).

53. As mentioned in my earlier reviews, I have viewed the video and photographic evidence provided by the submitters. I consider that the dust plumes in some of these videos is indicative of dust discharged from quarry operations which are not being undertaken in accordance with best practice dust control measures.

54. I am of the opinion that the proposed dust management plan measures (with the additional elements I recommend) will substantially reduce the potential for adverse off-site effects. Note that this is based on my understanding that the current/historic site dust management processes have been significantly inferior to that proposed.

9. Comments on the draft air discharge consent conditions.

55. I have reviewed the draft air discharge consent conditions provided by the applicant and have the following comments.

56. I consider that there should be a consent condition which prescribes the location of the material processing plant and associated stockpiles (i.e. they to be located the immediate surrounds of its current location). Also processing or storage of aggregate shall not occur within the proposed expansion area.

57. Condition 3: I consider that the wording of this condition should include “noxious, dangerous, offensive or objectionable”. This ensures that dust/particulate discharges which have the potential to generate an adverse health based effect are also controlled by the consent conditions.

58. Condition 10: I consider that there should also be a 10 minute average dust monitoring trigger level in addition to the longer term average triggers proposed. I am also of the opinion that TSP monitoring will be more appropriate to determine the potential for adverse off-site effects. Notwithstanding this, I consider that there may be a requirement to measure PM_{10} for the purposes of mitigating potential health based effects.

59. Condition 11 (b) mentions automated dust suppression watering systems, however I don’t recall any mention of automated watering systems in the application. If these are proposed, details of these would be helpful to better understand the application.

60. Condition 14: as discussed earlier I consider that the minimum meteorological monitoring station mast height should be 10 m above ground level.

61. Conditions 18 and 20: depending on what particulate size fraction is monitored on the boundary, the AS/NZS standard(s) which are applicable may need to be amended. In Condition 20, I note that the applicant is proposing that the mobile dust monitors may have a lower accuracy/sensitivity to that of the fixed monitor. I consider that should this occur that the mobile units should be required to have a minimum accuracy/sensitivity standard (i.e. the mobile units must be able to be able to maintain a calibrated accuracy of +/- 5% from the AS/NZS compliant instrumentation).

10. Conclusion

62. Overall, I consider that the proposed operation should be amended to include some of my recommendations above. Notably these include; a 100 m setback distance from the nearest off-site sensitive receptors, revised boundary dust monitoring equipment/trigger levels, an increased minimum weather station mast height of 10 m, and staged extraction and progressive remediation of the expansion area.

63. I consider that the proposed operation and associated dust management, if stringently applied, will be not result in chronic nuisance/detrimental cropping effects beyond the boundary of the site.

64. However, in my professional opinion, I consider that acute adverse dust effects may occur when dust generating activities are occurring close (within 100 m) to off-site receptors (crops and dwellings). These acute adverse effects may occur during the period between when dust is observed (either visually or via the boundary dust monitors) and the time it takes to cease activities within the proposed 250 m setback distance. As such I consider a minimum 100 m buffer distance is appropriate.

65. I reserve the right to comment further on the potential for health based effects once I have reviewed the additional information which Mr Cudmore proposes to present in his evidence.

Date: 23 November 2021

Donovan Van Kekem