

IN THE MATTER OF the Resource Management Act
1991

AND

IN THE MATTER OF resource consent applications by
various parties to take and use
water from rivers, streams, canals
and lakes in the Upper Waitaki
Catchment.

REBUTTAL OF IAN MCINDOE

INTRODUCTION

Background and Qualifications

1. My full name is Ian McIndoe. My qualifications and experience have been presented to you in my MWRL evidence on 22 September 2009.

Code of Conduct

2. I have read the Code of Conduct for Expert Witnesses (Rule 330A, High Court Rules and Environment Court Practice Note) and agree to comply with it. I confirm that I have complied with it in the preparation of this statement of evidence.

HYDROLOGY CAUCUSING

3. On 15 October 2009, technical experts representing MWRL, Meridian and CRC met at Environment Canterbury to discuss the MWRL hydrology evidence.
4. MWRL was represented by J Bright (chair), I McIndoe, D Mzila, N Gamage, and J Male. Meridian was represented by G Griffiths and CRC by T Heller.
5. The topics discussed were:
 - Lake residence times;
 - Low flow assessments (MALF versus MAF) in the sub-catchments;
 - Contribution of groundwater to surface water;
 - Assessment of nutrient quality and quality with respect to flow;
 - Mass balances and water balances;
 - Nutrient load calculation methods.

6. Most of the discussion revolved around understanding in more detail what was done and why. This involved discussing processes, methodologies and assumptions used in reaching the conclusions expressed in the MWRL reports. In addition, there was discussion around differences in the MWRL report outcomes and previous work.
7. The more detailed information on issues such as mass balances and groundwater-surface water was primarily provided to Dr Griffiths and Mr Heller by Dr Bright and Dr Mzila.
8. Dr Mzila will discuss in further detail the topics that were discussed in the caucusing.

REBUTTAL

9. The purpose of this section of my evidence is to respond to the Meridian evidence of Rob Potts. I have prepared this rebuttal at the request of Mackenzie Water Research Ltd (MWRL).

Review of documents

10. In preparing this evidence, I have referred to the following documents:
 - Waitaki Catchment Water Allocation Regional Plan (WWAP);
 - WQS reports (August 2009);
 - The MEL evidence of Rob Potts (water allocation matters, farm management).

WATER ALLOCATION MATTERS

11. Mr Potts (para 10) refers to McIndoe (2004) and states that “the assessed annual volume is also referred to as reasonable use or the volume of water that is supposedly used during an irrigation season”
12. *The term “reasonable use”, does not, and did not, represent the volume that was actually used. It was an estimate based on what would be needed if water was used efficiently. I acknowledged that actual water use in some cases would be higher and in other cases lower than the reasonable use figures.*
13. Mr Potts (para 24) states that the allocation limit for “upstream of Lake Ohau Outlet” from Rule 6, Table 5 in the WWAP, is exceeded.
14. *I agree that in the case of Lake Ohau, the allocation limit is exceeded and makes some takes non-complying. I addressed that issue in the individual evidence.*
15. Mr Potts (para 25.3) again states that the 77 Mm³/y from McIndoe (2004) was based on reasonable use and not consented entitlement, and as this was the basis of existing use in the WWRP, future uses will not be classified as discretionary activities unless significant efficiency gains are made.
16. *The 77 Mm³/y was not the basis of existing use. It was an amount allowed for existing allocation. The fact that efficiency gains would have to be made for all takes to stay within the allocation limits was made clear by the commissioners when they set the allocation limits (see S32 reports and my evidence Para 40).*
17. *Also, Commissioner Skelton ruled that diverts were to be counted in the allocation, despite the fact that diverts were not included in the 77 Mm³/y. Unless the plan is changed, it also could mean that diverts will have to be eliminated to allow full entitlement to the 25,000 MIC shares to be taken up. These are issues for the future, not for this hearing.*
18. Mr Potts (para 28.4) notes that Tara Hills consents and Omarama Station consents have consent conditions requiring reductions in volume over time and that 1300 mm for water allocation purposes would be appropriate for existing systems.
19. *In fact Omarama Station has already changed from borderdyke to pivots and reduced their allocation from about 8 Mm³/y to 3.4 Mm³/y, which to me is consistent with the WAB Commissioners expectations of improvements in efficiency.*
20. *Mr Potts does not mention Benmore Irrigation Company, which is the main irrigation take that has undergone a change in irrigation method that potentially has a significant impact on use. It was consented on the basis of 4000 ha of borderdyke irrigation, when in fact it is using spray irrigation (pivots and K line). I don't think that 1300 mm/y is appropriate for that.*

21. Mr Potts (paras 28.5, 46) notes that Aqualinc modelled the borderdyke irrigation as 1200 mm/y, rather than the 900 mm used in McIndoe (2004).
22. *Again, Mr Potts is confusing allocation and actual use. The Aqualinc modelling for the WQS was to determine drainage values and irrigation demand using historical climate data to represent past activities so that impacts on water quality could be determined. It was not about allocation.*
23. Mr Potts (paras 31-34) summarises allocation totals and limits and states that while the total allocation limit is met, the Ohau and Pukaki catchment allocations are exceeded.
24. *The 272 Mm³/y allocation volume as I understand it is the most up to date figure available, based on the applied assumptions, and that in total, all applications in the hearing fall within the 275 Mm³/y limit.*
25. *I have already referred to the exceedence of the Lake Ohau limit.*
26. *Simons Hill/ Simons Pass have three alternative supply points for their proposed takes – Tekapo Canal, Pukaki Canal and Lake Pukaki. Only one will be used. The Tekapo Canal and Pukaki Canal options fall within Table 5 (iv) and therefore comply with the limit. The Lake Pukaki take falls within Table 5 (ii) and therefore is non-complying. That will be addressed in the individual evidence.*
27. Mr Potts (paras 38-40) summarises existing share issues and notes that future applications by MIC shareholders will inevitably be classified as non-complying.
28. *Currently, out of the 25,000 MIC shares available, 17,363 shares have been issued. My understanding is that Meridian has given derogation approval for a volume of water equivalent to about 15,100 shares for consents in this hearing. I'm not sure where Mr Potts figure of 15,684 ha has come from. However, it is not important in the context of this hearing.*
29. *I think Mr Potts' comments that if MIC shareholders apply for resource consent for the remaining 9,000 ha, they will not comply with the 275 Mm³/y allocation limit, is premature. My view is that if allocation to existing irrigation was based on reasonable and efficient use, i.e. if efficiency improvements are implemented, there will be sufficient water for all MIC shareholders, plus capacity to expand the existing areas assigned allocations for borderdyke irrigation.*
30. Mr Potts (para 44) explains where the proposed Upper Waitaki Irrigation Scheme allocation of 26.3 Mm³/y came from and suggests that my estimate of 19 Mm³/y would be for on-farm allocation alone.
31. *The 19.4 Mm³/y came from information presented to the WAB by Mr Potts; information that was subsequently used by the WAB when setting the Upper Waitaki allocation limit. It may be that Mr Potts now believes that the original figure was wrong, but that does not change the allocation limit.*

32. *The use of 26.3 Mm³/y, which is 7 Mm³/y above that allocated for the Scheme, will do what Mr Potts has indicated – make applications for new water non-complying. My view is that it would be inconsistent with the WWAP and the intent of the commissioners for 26.3 Mm³/y to be used indefinitely.*
33. *I fully accept that based on the current infrastructure and operation that the 19 Mm³/y limit would be challenging for the Scheme to meet. However, I believe that over time, significant efficiency improvements can be made and that the 19 Mm³/y limit is realistic in the long term.*
34. Mr Potts (paras 47.1, 47.2) agrees that the 275 Mm³/y limit is not exceeded and repeats that some of the remaining applications up to 25,000 ha will be non-complying. He suggests that it would be unwise to allow for significant future savings in use to occur through efficiency improvements.
35. *In reality, no one know what the future will bring. The commissioners indicated what they would like to see. My estimate of 600 mm for spray is generally accepted. Where borderdyke is converted to spray, my assessment allowed for a 50% increase in irrigated area or that water to be used for operational purposes (if supply was not piped), because 900 mm was assumed for borderdyke and 600 mm for spray.*
36. *However, any increase in area needs to consider water quality, which could limit expansion in some areas. What is known is that if all users in the basin adopt efficient practices, there will be enough water.*

FARM MANAGEMENT

37. Mr Potts (paras 10-12) summarises the areas used for the various irrigation areas (existing, allocated and proposed) and states that the 8,850 ha of existing irrigation should have included the 1527 ha of area allocated but not irrigated.
38. *The whole point of establishing actual irrigated area using satellite imagery and on-farm visits was not to determine allocated area. It was to determine the area that would have contributed to the existing water quality environment for the water quality modelling – a completely different purpose. Therefore, the area of existing irrigation is what was required.*
39. Mr Potts (para 14) Table 1 (which are areas, not annual volume allocations) presents a summary of areas in various categories.
40. *I think Mr Potts has confused areas actually irrigated, consent irrigated areas, replacements (which unless they have increased area should be in existing consented areas), new applications and MIC shareholding.*
41. *To remove some of the confusion, the approximate areas are:*

Category	Approx area (ha)
Consented existing incl. renewal of existing	10,900 ¹
Actual existing irrigated	8,990 ²
New applied for in this hearing	15,100 ³
New MIC shares issued	17,363 ⁴
Unissued shares	7,637 ⁵

1 – From McIndoe (2004) plus adjustments; includes straight renewals;

2 – From MWRL final summary report;

3 – Based on MEL derogation approval;

4 – Supplied by MIC;

5 – Balance of 25,000 MIC shares.

42. *These figures show that existing consented area is not fully irrigated, hence the need to use actual irrigated areas in the water quality analysis. The areas provide an indication of the existing and future scale of irrigation in the Upper Waitaki Basin, which was used in the water quality analysis. Annual volume allocations are a different matter, and for the purposes of this hearing, have been agreed.*
43. Mr Potts (para 15) notes that there are various figures on areas presented in the reports and suggests sensitivity analyses around areas.
44. *The purpose of identifying areas of actual irrigation by Aqualinc was to ensure that the various combinations of soils, climate and irrigation type were covered. The water quality analysis was done on the basis of the GHD areas, with drainage determined from the Aqualinc matrix. The fact that the two areas didn't match is of little or no consequence to the study outputs as the correct drainage figures were applied to the actual areas determined by GHD.*
45. Mr Potts (paras 18-21) states that what was modelled was not conservative enough, and that drainage volumes under spray irrigation could be much higher than modelled. He suggests that for existing irrigators to achieve the application depths modelled, they would have to increase their amount of irrigation equipment. I presume Mr Potts is happy with the borderdyke modelling, which used about 1200 mm/y (close to his figure of 1300 mm/y). However, he appears to dispute the spray irrigation modelling.
46. *The majority of irrigation systems in the upper Waitaki basin by far are either borderdyke or centre-pivots. There is also some K line and a few guns, but they cover a minor area. There are very few travelling irrigators, so Mr Potts' concerns are unwarranted.*
47. *Fixed centre-pivots, as the majority of the systems are, can easily apply whatever depth is programmed into them, subject to their maximum capacity. More equipment is not needed to apply small depths of water. The only exceptions may be the two very long pivots in the basin, where tower travel speed limits the minimum depth of application. However, it is unlikely that depths as low as 15 mm could not be applied.*

48. *With the proposed new takes, the 600 mm annual allocation limit will require very efficient irrigation management to avoid some crop production losses, so it could be that the modelled drainage values are an over-estimate for the new areas.*
49. Mr Potts (para 23-26) says he could not quantify the implications of the assumptions used in the irrigation modelling. However, he refers to the different drainage values presented in the MWRL evidence and concludes that the drainage rates appear reasonable.
50. *All of the critical inputs used in the modelling are listed in the Aqualinc report. Full details of the Irricalc model have been provided to CRC and are publicly available.*
51. *I find it odd that Mr Potts has indicated that the Aqualinc drainage modelling could underestimate drainage values when the Aqualinc values are in fact higher than Mr Potts own figures (Potts, para 23).*



Signed _____ .

Ian McIndoe

October 2009

REFERENCES

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- McIndoe, I. (2004) “Mackenzie Basin irrigation takes – consent review”. Prepared for Mackenzie Farmers Group by Aqualinc Research Ltd. Report no. L05112. Unpublished., September 2004.
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