BEFORE THE INDEPENDENT COMMISSIONERS

IN THE MATTER of the Resource Management Act 1991

AND

IN THE MATTER of the Proposed Canterbury Land and Water Regional Plan

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SUPPLEMENTARY EVIDENCE OF JIM COOKE ON BEHALF OF NELSON/MARLBOROUGH, NORTH CANTERBURY AND CENTRAL SOUTH ISLAND FISH AND GAME COUNCILS
8 May 2013

ANDERSON LLOYD
LAWYERS
DUNEDIN

Solicitor: Maree Baker-Galloway

Level 10, Otago House
Cnr Moray & Princes Street,
Private Bag 1959,
DUNEDIN 9054
Tel 03 477 3973
Fax 03 477 3184

QUALIFICATIONS AND EXPERIENCE

1. My name is James Grainger Cooke. My qualifications and evidence were set out in my Evidence in Chief, dated 2 April 2013.

2. This rebuttal evidence addresses specific points raised by Shirley Haywood in her rebuttal evidence.

3. I have again prepared this evidence in compliance with the Code of Conduct for Expert Witnesses contained in the Environment Court Practice Note 2011.

ATTENUATION COEFFICIENTS AND N LOSS ESTIMATES

4. Ms Hayward (rebuttal evidence #3.2) is of the view that our calculated attenuation rates are unrealistically high compared with other estimates of attenuation in NZ, and that the reason is likely to be that we have over-estimated N lost from the land compared to measured N loads in the stream.
5. The attenuation coefficients given in my EIC may be low (high attenuation) compared to some other catchments, but we know these vary significantly between catchments For example Alexander et al. (2002) estimated N attenuation coefficients for the Waikato, NZ, in the range of 0.39 – 0.89. Wilcock et al (2013) inferred very low attenuation in the Inchbonnie catchment (Westland) but this was in a catchment with very high rainfall (5m/y). Internationally, Behrendt and Opitz (2000) quantified N attenuation coefficients in the range of 0.1 – 0.4 (average of 0.2 – 0.3) which agree very well with the range in my evidence in chief. Furthermore we performed a site-specific calibration for the catchments presented in my EIC, with very good agreement between catchments of similar size.
6. In addition, I believe that the reference cited by Ms Hayward (Rutherford 2013), used to support the argument for a higher attenuation coefficient, is not directly relevant to this discussion. My understanding of that study is that it is focused on *instream* attenuation only, not catchment-scale attenuation, which includes a combination instream, land surface, and sub-surface attenuation.

Regardless, that report is not yet not published nor even publically available in draft form. Therefore, the assertion of Ms Hayward regarding this report can be neither confirmed nor denied at this stage.

7. Leaching estimates were made using the best available science. As noted in my EIC (#36) pastoral agriculture export coefficients were estimated by Dr Dewes based on her company's experience in using both versions of OVERSEER® on Canterbury farms. I also note that our estimate for N leaching under dairy in the Ashburton catchment (67 kg N/ha/y) is identical to the value given by Dr Roberts (his #87) for a South Canterbury dairy farm.

8. Ms Hayward is correct is observing that we predict N caps in the range 30-40 kgN/ha/y plus the Aeru irrigation scenario are predicted to 'hold' current N loads or concentrations near current levels. However a cap of between 20 and 30 kg N/ha/y is predicted necessary to effect a significant reduction in these catchments where water quality outcomes are currently not met (Selwyn-Waihora) or at risk (Ashburton).

CONCLUSIONS

9. I acknowledge that the modelling presented in my EIC is realtively simple and contains several assumptions that may not be necessary if a more sophisticated model were developed. Nevertheless in my view it is fit the purpose for which it was developed. It allows for a direct cause and effect relationship between water quality and farm losses to be determined for the purpose of setting an N loss cap from farms. Failure to develop this cause and effect relationship, albeit assumed, means that there is no tangible link between on-farm N loss performance and environmental state. That then leads to there not being any ability to be able to evaluate the effectiveness of management measures intended to address environmental effects.

DATED this 8th day of May 2013

Dr James G Cooke

REFERENCES

Alexander, R. B., Elliott, A. H., Shankar, U., McBride, G. B. 2002. Estimating the sources and transport of nutrients in the Waikato River Basin, New Zealand, Water Resources Research 38(12). 1268, doi:10.1029/2001WR000878, 2002.

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Wilcock, R.J.; Monaghan, R.M.; McDowell, R.W.; Verburg, P.; Horrox, J.; Chagué-Goff, C.; Duncan, M.; Rutherford, A.; Zemansky, G.; Scarsbrook, M.; Wright-Stow, A.; Howard-Williams, C.; Cotton, S. (2013). Managing pollutant inputs from pastoral dairy farming to maintain water quality of a lake in a high-rainfall catchment. *Marine and Freshwater Research* (in press).