IN THE MATTER OF The Resource Management Act 1991

AND

IN THE MATTER OF **The Proposed One Plan:** Consolidated Regional Policy Statement, Regional Plan and Regional Coastal Plan for the Manawatu - Wanganui Region

Statement of Evidence of Antony Roberts

Qualifications / experience

1. My name is Dr Antony Hugh Coleby Roberts. I am the Chief Scientific Officer for Ravensdown Fertiliser Co-Operative Ltd. I have a Batchelor of Agricultural Science degree (1st Class Honours) and a Doctor of Philosophy degree in Soil Science, both from Massey University. I obtained a Certificate of Completion for the Massey University Sustainable Nutrient Management in New Zealand Agriculture course in 2004 and one for Advanced Sustainable Nutrient Management in 2006. I am a Fellow of the New Zealand Soil Science Society and a member of the New Zealand Institute of Primary Industry Management as well as on the Executive Committee of the New Zealand Grassland Association.

2. Prior to joining Ravensdown in 2002, I was a practicing agricultural scientist for the past 22 years working for the Ministry of

Agriculture and Fisheries Agricultural Research Division as a District Agricultural Scientist based in Taranaki from 1980 to 1988, as the Soils and Organics Group Leader in MAFTech at Palmerston North and Flock House in Manawatu/Rangitikei (1988 to 1990). I eventually transferred to the Waikato (1990 to 2002) where I held the position of Group Leader of the Soils and Fertiliser Group and latterly as a Senior Scientist in the Land Management Group of the Pastoral Agricultural Research Institute of New Zealand, which trades under the name of AgResearch.

3. My research and consultancy interests included soil fertility (particularly in dairying), agronomy, heavy metal accumulation in agriculture, environmental performance indicator monitoring and interpretation, and waste utilisation or disposal to grazed pasture. I have also worked in Tasmania, mainland Australia, Japan and South Africa in the area of soil fertility management on pastoral farms. I am either the senior author or a contributing author of 54 refereed Scientific Journal or Conference papers, a further 53 scientific or extension conference papers, 4 book chapters and 4 extension booklets.

4. Over the past 25 years I have not only conducted many soil fertility experiments but have also had an active consultancy role, particularly with pastoral farmers throughout the country, on soil fertility management to maximise economic return, and more latterly to couple that with minimising off-farm impacts on the environment. In my current role, I am responsible for managing the research and development for Ravensdown, for training the 70 Field Officers as well as other staff in soils, fertilisers and pastoral agriculture as well as working with many of our Corporate and other farming shareholders.

Introduction

5. Ravensdown is 100% farmer owned co-operative with over 27000 shareholders in New Zealand. On behalf of its shareholders Ravensdown manage three superphosphate manufacturing plants at Awatoto, Hornby and Dunedin. Ravensdown own Wanganui Aeroworks are joint venture operators of many groundspread firms and own and operate lime quarries throughout New Zealand. Many of Ravensdown's dairy and sheep and beef shareholders farm in the Horizons management area.

The Land Use Classification Assessment

6. Ravensdown is opposed to the use of the Land Use Classification (LUC) system being used to determine the allowable current and future allowable N losses from farms. This opposition is on the basis that the system was not designed for this purpose and leads to distortions in allowable N losses that will adversely impact on farm productivity. I note that the Land Use Classification system has been well described in the Section 42A report of Dr Grant Brodie Douglas. The LUC is, as explained, a classification of the *suitability* of land for one or more productive uses after consideration of the land's physical limitations, rather than its productive potential in either an unimproved or improved state.

7. The classification takes into account the physical resources of the land such as rock type, soil type, slope, erosion type and severity and vegetation cover. Climate and previous land use effects are also assessed. The physical resources are used to divide land into 8 classes – the eight classes used by Horizons to allocate allowable N loss. There is no objective assessment of the actual productivity of the land within the eight classes.

8. The LUC then divides each class into a subclass identifying the dominant physical limitation such as erodibility, wetness (poor drainage or flooding risk), soil (shallow soil, pans, stoniness, low water holding capacity, low fertility etc.) and climate (summer drought, excess rainfall, frost, snow, wind and salt spray). Again, no objective assessment of actual productivity is used in the sub class, even though logic suggests that many of the potential limitations described above will impact on productivity. However, modern agricultural technology allows land managers to overcome some of these physical limitations through flood protection, drainage, enhancing soil properties through soil management techniques such as building organic matter, fertiliser use and introducing irrigation – all of which can be successfully undertaken where the economics of the enterprise allows.

9. Horizons have already recognised that this is possible through the acknowledgement that irrigating the Manawatu sand country permanently increases the productive capacity of that land class and while I concur with this recognition, to be consistent I believe Council should now apply this principle across all 8 land classes.

10. In my view, it is only when the LUC unit, the most detailed level of the classification, is arrived at that a productivity index is considered. The LUC unit describes land which is homogenous with respect to management requirements, conservation treatment and suitability for the same type of crops, pasture or forestry with similar potential yields. With respect to pastoral use this is based on stock carrying capacity.

11. Stock carrying capacity is itself a moving target as technology, knowledge and experience allows land managers to improve pasture productivity and hence either carry more animals per hectare or increase per animal performance (both of which equate to an increase in stocking rate or carrying capacity).

12. Moreover, within each land class, subclass and unit will be land managers who have a range of skills and abilities which will enable the best ones to exceed the stock carrying capacity allocated, while others will not be able to approach this figure yet under the current proposal all will be treated the same with respect to allowable N loss.

13. It is my view that using the LUC system at the class level does not fairly attribute allowable N losses to farms within each class because it takes little or no account of actual productivity differences either within or between classes.

14. I would therefore like to submit that the allowable N loss limits set for each land class while scientifically informed are nonetheless inexact and somewhat arbitrary targets created in the hope that regional water quality will improve should these reductions be achieved.

15. In my view, a more equitable system would be to assess each property within Water Management Zones in terms of their current estimated N loss and adopt an individualised staged process of achievable reductions in N loss, given current mitigation technology, over practical timeframes.

Use of OVERSEER

16. Ravensdown, as one of the owners and investors of OVERSEER by way of its membership in FertResearch, fully endorses the use of this tool in terms of estimating the N loss from pastoral farm systems.

17. As explained in Dr Stewart Francis Ledgard's Section 42a report the programme is based on sound science and is regularly updated to reflect both advances in scientific understanding and also the requirements of describing complex and evolving farm systems.

18. Ravensdown Account Managers now use this programme as a matter of course on all dairy farms and larger sheep and beef properties as part of the matrix of tools and techniques to assist our land manager shareholders to manage nutrient flows into and out of their properties.

19. However, as noted in Dr Ledgard's report, OVERSEER is a long term equilibrium model which estimates N loss when a farm system is in a stable state and using best practice, as outlined by scientific understanding of nutrient flows in agricultural soil/plant/animal/climate systems. It should also be remembered that OVERSEER estimates of N loss are subject to at least a variation of +/- 30%, as stated in the Summary Report in an OVERSEER nutrient budget.

20. Season to season and year to year variations in climate, feed supply and on-farm management, while they are known to affect N loss markedly, are not dealt with by OVERSEER and as such cannot be used to assess effects of one off summer drought or abnormal rainfall events on N loss, as some people seem to think it should.

21. The overall objective of using OVERSEER should be to establish a benchmark N loss figure for a property and over time with management changes demonstrate a long term reduction in N loss.

22. OVERSEER should be used by properly trained and qualified people using long term average data appropriate to the regional or sub-regional area in which the farm lies.

Good Environmental Practices (GEPs)

23. Dr Ross Martin Monaghan, in his Section 42a Report, identifies a number of key points about the suite of potential mitigation practices available to land managers to deliver reductions in N loss from pastoral farms.

24. Dr Monaghan points out that the effectiveness of the GEPs depends on soil type, topography, climate, land use and farm management system. Additionally, the point is made that no two farms are necessarily the same and so a different range of mitigations may be appropriate on different farms.

25. Dr Monaghan has given estimates of the costs of GEPs, on a $/kg N not lost basis, and this shows there is a considerable range in the costs associated with different mitigation options.

26. While I have no concerns about these assertions, I would add another important factor in the success or otherwise of mitigation options employed on farm to reduce N loss. This factor is the wide range in skills, abilities and attitudes to business risk exhibited by both land managers and their staff.

27. Issues associated with getting GEPs adopted on farm are illustrated in the *"Evaluation of the Integrated Catchment Management Pilot Project – final report June 2009"* recently released by Environment Waikato. In the study which involved farms from the Little Waipa and Waipapa catchments, findings showed that one-on-one farm planning advice by skilled people was effective in encouraging on-farm change.

28. Farmers were willing to adopt GEPs which were affordable, did not affect productivity/profitability adversely and fitted the farm system. Additionally, the practices had to be proven to work.

29. In support of the intent of the One Plan, the lack of clear nutrient targets and guidelines for some of the actions required were barriers to adoption i.e., farmers needed to know not only what is required but perhaps more importantly – how to get there.

30. In the Little Waipa, 20 dairy farms reduced N loss by 4 kg N/ha (from 42 to 38 kg N/ha), and in the Waipapa a 'modelled' reduction

of 9 kg N/ha (37 to 28 kg N/ha) was achieved. There was still a 'gap' of 4 to 8 kg N/ha between what was achieved and what was deemed to be sufficient to have *"no net change in water quality"*.

FARM Strategy

31. I have concerns with the conclusions, with respect to the achievability of the N loss targets, of the Section 42A report by Dr Andrew Keith Manderson which essentially claims that the immediate N loss targets are easily achievable with current mitigations and GEPs.

32. I acknowledge that Horizons has made attempts to be transparent about the 6 case studies undertaken by holding at least 2 public forums where the interim results were presented. There were some reservations about the way the analyses were undertaken expressed at these meetings, especially with respect to OVERSEER analysis and the inputs used to derive the N loss reductions.

33. The extreme positivity about the ease with which the targets will be met, especially with respect to the more intensive farms, is at odds with the Environment Waikato ICM study findings.

34. Further evidence of this can be found in the just released Upper Waikato Nutrient Efficiency Study, which involved 10 dairy farms and 4 sheep and beef farms. The 10 dairy farms were split into 3 levels of intensity i.e., Low, Medium and High and one dairy farm was organic. The project set a 26 kg N/ha leaching goal for the dairy farms and 12 kg N/ha for the sheep/beef farms. All farms exceeded these limits at the start of the project, except for one very extensive sheep/beef farm. The project looked at the effect a number of mitigations for N leaching had on these farms as well as the financial implications of these measures.

35. Profitability across farms differed greatly depending on both production efficiency and type of mitigation used. The intensive

dairy farms had both the greatest difficulty in meeting the leaching target and the greatest effect on profitability, despite the greater flexibility they had because of their business infrastructure. The low and medium intensity farms showed the potential to increase efficiency, while reducing N leached, through better farming skills and decisions. This last point goes to the earlier point (12) about the range of skills and abilities within a farming community within the same land class.

36. Furthermore, in the Section 42A report of Dr Mark Anthony Shepherd, Dr Shepherd reports that five case study farms were chosen, by Horizons staff, which were thought to struggle to meet the allowable N loss limits proposed in the One Plan.

37. The OVERSEER modelling for each farm showed this largely to be the case, especially for the dairy farms. The two non-dairy farms (irrigated beef, intensive cropping) met the proposed initial N loss, but 2 of the 3 dairy farms needed to reduce N loss by 9 kg N/ha immediately. The third dairy farm had a large non-dairy area which offset the dairy platform losses.

38. Importantly, the FARMS reports investigated good fertiliser and effluent management, nitrification inhibitors and stock exclusion in autumn/winter as potential mitigations. Some of these mitigations (or GEPs) bore significant cost and were insufficient to meet the targets.

39. The study reported by Dr Shepherd supports the findings of both the ICM Study and Nutrient Efficiency Study from the Waikato.

Conclusion

40. In my view, the use of the LUC system to set single number allowable N loss targets is inappropriate, as it is not fit for purpose. This is because it unfairly penalises farm businesses who have introduced technologies and developed skills and abilities to farm

productively, despite the limitations imposed by the physical resources of the land area involved. While land managers must know what N loss limits they need to strive for, setting unrealistically achievable reductions will not, in my view, lead to compliance by even the most willing land manager. Given the modest reductions in N losses achieved or modelled in studies to date coupled with the barriers to adoption discussed earlier, all parties should be prepared to accept that achievement of ‘stretch’ water quality targets with respect to N loss will be realistically only achievable by a reduction in N cycling in grazed pasture systems. This means a reduction in pastoral agricultural production and the consequent effect on individual farm business profitability and the regional economy.