Before the Commissioners appointed by Canterbury Regional Council

IN THE MATTER OF	the Resource Management Act 1991
AND	
IN THE MATTER OF	Water permit applications by Simons Pass Station Limited, Simons Hill Station Limited.

STATEMENT OF EVIDENCE OF Hessel Willem Tacoma

INTRODUCTION

1. My name is Hessel Willem Tacoma. I am qualified Veterinarian and work as a farm consultant.

2. I am a practising Farm Management Consultant and have done so in varying degrees since 1996.

3. I am a graduate from Utrecht University, the Netherlands. I have worked in clinical veterinary dairy practice in the Netherlands for approximately 7 years, followed by clinical dairy practice in New Zealand for approximately 10 years.

4. I have developed specialist knowledge of dairy farming systems and financial performance of dairy farms.

5. I operate as a dairy farm consultant as a franchisee of Intelact Ltd, a company based in Te Awamutu, with branches in Australia and South Africa. I am a shareholder in this company.

6. I have a part ownership in a mid-Cantebury dairy farm, which employs a yard wash system similar to the one proposed below. The only difference is that it does not have a mechanical separator in place.

SCOPE OF EVIDENCE

7. In February 2010 I was requested by Simons Pass Station Limited to develop a design concept with the purpose of minimizing the amount of effluent produced on a 900 cow, 60 bail rotary dairy platform in the Mackenzie Basin.

8. I confirm that I have read and am familiar with the Code of Conduct for Expert Witnesses in the Environment Court Consolidated Practice Note (2006). I agree to comply with that Code. Other than where I state that I am relying on the evidence of another person, my 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 that I express.

9. I visited Simons Pass Station and Simons Hill Station on 12 March 2010.

Purpose of the design

10. The purpose of the design is to minimize the volume of liquid effluent created under normal operating conditions of the proposed dairy farms.

11. Minimizing the daily volume generated will allow the farming enterprise to collect all liquid effluent and tanker it off on a regular basis to a farm outside the Mackenzie basin, to be used as liquid fertilizer there. Any solid effluent generated will be utilized on farm as a soil conditioner. The removal of the liquid effluent will have the advantage of being able to more closely manage the environmental effects of the soil nitrate levels on the Pukaki Flats.

Dairy Effluent Volumes

12. I have reviewed the Ecan document for the discharge of dairy effluent (*CON080: Application for Resource Consent to Discharge Dairy Effluent & to Store Dairy Effluent*). The ECan assumptions of volumes are: approximately 10% of the raw effluent produced per day by the cow will be deposited in the milking shed. Ecan states that typically diluted effluent production is between 20 and 90 litres per cow per day. ECan assumes average numbers of 5.4 litres of raw effluent per cow per day produced in the shed plus another 50 litres (average) per cow per day of diluted effluent produced as a result of the washdown processes (*Application Form CON080, page 4*). I understand that Maria Bartlett has used the figure of 50 litres per cow per day in her own analysis (*Bartlett evidence presentation, 19 April 2010*).

13. The dry matter content of dairy effluent varies but standard values lie between 4% and 9% DM. Screw press systems are able to extract approximately 90-95% of solids from the diluted effluent.

14. Milk plant and milkvat wash water volumes are approximately 4,800 litres per day for a 60 bail rotary plant with twin 16,000 litre vats (*Chris Barclay, Milphos NZ Ltd*) resulting in an annual volume of approximately 1,200,000 litres. The annual volume of rainwater deposited on a 15m by 45m yard with an 500 mm rainfall is approximately 540,000 litres. However, the yard will be roofed and therefore no stormwater applies in this case.

15. The nutrient content of separated liquid and separated solid effluent varies, according to volumes of water used and feeding levels and feed composition of diets. As a general comment, the nutrient value of the solids is quite low (approx. 1.4 % N/kg DM and 0.2% P) with most of the nutrients found in the liquid fraction. An analysis of the solid fraction is attached.

Outlines of the design

16. The diagrams attached explain the design of the effluent system for the proposed dairy farms on the Pukaki Flats. Several features have been built in to reduce both the amount of raw effluent produced by the animals while on the yard and in the shed, and the amount of fresh washwater added to the system daily.

17. The milking shed yard will be covered to both shelter animals from the sun and to divert rainwater from the effluent system. By shading the animals while on the yard, they will experience less stress which will reduce the amount of dung and urine deposited during their stay. All rain water will be intercepted from the roof, collected, and piped into the stockwater system rather than allowing it to fall onto the yard and entering the effluent system as per standard practice on most dairy farms.

18. Just prior to animals entering the yard, the yard will be wetted using a small amount of fresh water. This will cool the concrete on hot days, reducing the amount of stress on the animals, and will help to reduce animal dung sticking to the surface.

19. A mechanical scraper will scrape most of the raw effluent off the yard after each milking into the solids wedge, reducing the amount of water needed to wash the yard. This process is now becoming a more common practice on new dairy shed yards as a means of reducing water usage and effluent volumes.

20. A flood water system will flood the yard with 30,000 litres of separated liquid, which is stored in the header tank after each milking. The yard has a slope of 2% – 2.5%, so the wash water will run from the top of the yard into the solids trap wedge, taking with it any raw effluent left on the yard after scraping.

21. A degree of separation will take place in the wedge by simple gravity. Once or twice a week, solids that have sunk to the bottom of the wedge are taken out using a front-end loader on a tractor and deposited into the solids bunker. A large diameter pipe mounted high in the wall of the wedge allows liquid effluent to flow into the raw effluent tank.

22. A stirrer is mounted in the raw effluent tank, keeping any solids in suspension and preventing a crust from forming. From the raw effluent tank, effluent is pumped to the separator.

23. The separator presses most of the solids (up to 95%) out of the effluent. This semi-dry material (approx. 40% DM) then drops into the solids bunker. The remaining liquid is piped to the separated liquid tank.

24. The solids bunker holds the separated solids until such time it is taken out and spread over the farm as a soil conditioner. Any seepage from the solids is collected and piped back into the raw effluent tank. The solids bunker is

roofed over to avoid any rainwater wetting the solids and potentially creating run-off or flooding.

25. The separated liquid tank simply holds the separated liquid. Some of the liquid is pumped to the header tank (30,000 litres, twice daily) for yard wash purposes. Any liquid to be taken off farm is pumped into tankers at this point and trucked away.

26. Fresh water is pumped to the shed for all shed-, plant- and vat washing purposes as well as for cooling the milk and (some of) the stock water supply. Water from the cooler will be piped back into the stock water system. From time to time, approximately once a month, cooler water will be used to fill up the header tank to avoid the header tank collecting a layer of solid effluent in the bottom. Wash water used to wash the platform and shed insides is collected and piped to the solids wedge.

27. All plant and vat wash water is piped away from the shed and injected into the mainline of the irrigation system and hence spread on the pastures. This water has no cow effluent mixed with it. At times that the mainline irrigation is not in use, a small travelling irrigator will be employed solely for the purposes of paddock disposal of this plant and vat wash water.

28. Finally any rain water collected on the dairy shed roof (clean water) is also piped into the stock water system.

Calculations

29. Taking the 50 litres wash-water plus the 5.4 litres raw effluent per cow per day quoted by ECan as a starting point, the amount of fresh water added to the effluent system on a daily basis will be approximately 10 litres per cow per day.

30. This is calculated as follows: In standard systems, a figure of 50 litres of wash-water per cow per day is used. Approximately 20% of that amount (10 litres

per cow) is produced in the shed. The majority, 40 litres per cow is produced on the yard (*Allied Water Systems, Leeston*). Add to this the 5.4 litres per cow of raw effluent produced gives 55.4 litres per cow. The vat- and plant wash-water (4,800 litres per day, 5.3 litres per cow), any excess cooler water as well as the stormwater (daily average 1.25 litres per cow) from yard and drafting area are normally added to the effluent system.

31. In the system proposed, the yard is washed with re-circulated effluent. Plant and vat wash water are kept separate and irrigated over the farm. The rainwater otherwise falling on the yard is collected on the roof and piped into the stockwater system. Cooler water is also directed into the stockwater system. The volume of effluent produced is therefore limited to the shed wash water (10 litres per cow) plus the raw effluent (5.4 litres per cow). The only other additional fresh water is the small amount used for wetting the yard and shed prior to milking, and 30,000 litres once a month used to flush out the header tank which works out to 1.1 litres per cow per day on average.

32. The volume of water entering the effluent system is therefore 900 * 11.1= 9,990 litres per day during the milking season. Add in the raw effluent produced of 5.4 litres * 900 cows = 4,860 litres per day, producing 14,850 litres per day. A truck and trailer unit holding 30,000 litres will be needed every 2 days to take away a full load of liquid separated effluent.

	Standard System	Proposed system
Wash-down water yard (litres/cow/day)	40	1.1
Wash-down water shed (litres/cow/day)	10	10
Subtotal dilute effluent (litres/cow/day)	**50**	**11.1**
Plant and vat wash water (litres/cow/day)	5.3	0
Raw effluent (litres/cow/day)	5.4	5.4
Storm-water (litres/cow/day)	1.6	0
Total Effluent volume (litres/cow/day)	**62.3**	**16.5**

33. One full header tank of fresh water is added to the system each month, to flush out any solids that have accumulated in the tank. This works out to 30,000/30days/900 cows = 1.1 litre per cow per day

Conclusion

34. The effluent system outlined above will allow technically and commercially viable collection and disposal of liquid dairy effluent from dairy farms in the Mackenzie basin, removing the need to spread the effluent on the land itself, and allowing greater control over nitrate discharges to the land.

Helwi Tacoma
April 2010

Form No:	5010644
Sampled:	30-Mar-2010
Received:	31-Mar-2010
Reported:	09-Apr-2010

NZLABS

Auckland - Hamilton - Hastings - Christchurch - Dunedin

Any interpretation or recommendations are prepared independently by your consultant

Client Details

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Telephone: 03 325 4347

Property Name Simons Pass Station

Consultant Details

New Zealand Laboratory Services Ltd
Ruakura Research Centre
PO Box 281
East Street
HAMILTON

Test Results

Sample Name	TKN Total Kjeldahl Nitrogen %	TP Total Phosphorus %	K Potassium %	TS Total Sulphur %	DM[†] Dry Matter %
Dung	0.591	0.089	0.314	0.152	41.6

Test Units and Test Methods

Test	Unit	Unit Description	Test Method
TKN	%	g N per 100g (wet wgt)	Kjeldahl digestion, Titrametric determination.(excludes NO3_N)
TP	%	g P per 100g (wet wgt)	HCl / HNO3 digestion, Colorimetric determination
K	%	g K per 100g (wet wgt)	HCl / HNO3 digestion, AAS determination
TS	%	g S per 100g (wet wgt)	HCl / HNO3 digestion, ICP_OES determination
DM	%	g per 100g	Dried at 105 Degrees Celcius

[†] Indicates tests which are not IANZ Registered.

[$] Indicates Subcontracted Tests

Signed

Brent Miller: Soil & Fert Team Leader

international accreditation new zealand

All results reported on material AS RECEIVED unless stated otherwise.

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