BEFORE THE HEARINGS PANEL APPOINTED BY CANTERBURY REGIONAL COUNCIL

UNDER the Resource Management Act 1991 (RMA)

AND

IN THE MATTER of an application by Canterbury Regional Council

for resouce consent to discharge agrichemicals to rivers and their connected waterbodies, air and the coastal marine area, and the clearance of vegetation, for the purposes of weed management to provide flood, erosion, drainage and river enhancement works.

STATEMENT OF EVIDENCE OF TONY MICHELLE ON BEHALF OF CANTERBURY REGIONAL COUNCIL (APPLICANT)

3 March 2024

SUMMARY STATEMENT

1 I am an agricultural aviation consultant with decades of experience as a helicopter pilot, including the discharge of agrichemicals, and providing advice as an aviation consultant.

2 Pilots discharging agrichemicals are required to hold a commercial pilots license and additional agrichemical specific qualifications. This is required by the Civil Aviation rules. This training includes the requirement for pilots to identify and manage risks associated with the aerial discharge of agrichemicals,

3 Helicopters are fitted with on-board GPS systems, and they can record flight paths and spray discharge locations. Equipment and functionality can be readily adjusted by the operator to manage spray drift. Operations will cease immediately when spray drift is deemed unacceptable.

Introduction

4 My full name is Antony Michael Michelle. I am a former self employed helicopter pilot owning my own helicopter company from 1989 to March 2022 based in North Canterbury.

5 The Company conducted helicopter operations NZ wide that included the Canterbury region. I now work as an aviation consultant, and I have held this position since April 2022.

6 I have been asked to provide expert evidence, for the Applicant, regarding agrichemical spraying using helicopters.

Qualifications and Experience

7 I have been in the agricultural aviation industry since 1983 completing 11,000+ hours of flying as a helicopter pilot.

8 I recently sold my interests in a Company that I owned and managed for 33 years specializing in agricultural aviation activities including land and aquatic weed control, crop protection, fertiliser application, and pest eradication (including International and NZ offshore islands).

9 As an aviation consultant my role includes advising members of the NZ Agricultural Aviation Association on safety, the implementation of best practices and regulatory requirements and representing their interests at

district council plan reviews (use of airstrips and helicopter landing areas) and regional air and freshwater plans relating to the aerial discharge of fertiliser, agrichemicals and vertebrate toxic agents (VTA's).

10 I present this evidence independent to that role.

11 I have conducted riverbed spraying by helicopter in the Canterbury region annually during my time as an operator.

Code of Conduct

12 I can confirm that I have read and am familiar with the Code of Conduct for Expert Witnesses contained in the Environment Court Practice Note 2023. I have complied with the Code of Conduct in preparing this evidence and I agree to comply with it while giving any oral evidence during this hearing. Except 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.

13 Although I have been contracted by the applicant, I am conscious that in giving evidence in an expert capacity that my overriding duty is to the Hearings Panel.

Scope of evidence

14 I have been asked to provide evidence on behalf of the applicant to inform resource consent applications to discharge agrichemicals and clear vegetation.

15 My evidence relates to the discharge of agrichemicals from helicopters and address the following matters:

(a) Pre-job planning;

(b) Operator qualifications and experience;

(c) Helicopter instrumentation and equipment;

(d) Helicopter operations.

16 Such evidence is within my area of expertise.

Pre-job planning

Pre-job planning includes:

17 A detailed description of the task, agrichemicals to be used, mixing rates and the appropriate equipment for application e.g. nozzle types.

18 Detailed mapping of the treatment area(s) and any exclusion zones.

19 Preferably, and more often than not, mapping is provided both in hard copy and electronic format which is entered into the aircrafts onboard GPS guidance system.

20 Prepare, or participate in preparing, a site-specific safety plan to identify hazards and ensure all onsite personnel are aware of the hazards and the controls to mitigate any risks.

21 The site-specific safety plan will include a description of the works to be undertaken (a Statement of Works (SOW) for ECAN works)

22 Interrogating local weather forecasts to ensure conditions are suitable for the proposed treatment period.

23 Conducting an on-site task briefing with all company staff and the client (site manager) immediately prior to operations beginning to verify the treatment area, chemicals to be used and mixing rates, exclusion zones, hazards, sensitive areas, and any notifications that are required have been undertaken.

24 Conducting an aerial overflight with the client (site manager) to identify hazards, sensitive areas, and treatment areas.

Operator qualifications and experience

25 Agricultural aircraft operators are competent at ensuring legislative and environmental protections are met and our pilots are professionals who operate in a high-risk low-level environment.

26 To apply agrichemicals by helicopter, pilots are required to be highly trained in accordance with the Civil Aviation (CAA) rules that regulate agricultural and rural aviation.

27 To apply agrichemicals by helicopter, in accordance with CAA Rule Part 61, a pilot must successfully complete a training course (with assessment)

in agricultural chemical application conducted under the authority of an agricultural aircraft operator certificate (issued under CAA Part 137) or an aviation training organisation certificate (issued under CAA Part 141) which includes:

- A commercial pilot's licence (helicopter), and
- A pilot chemical rating (revalidation and assessment required every 5 years), and
- A minimum of a grade 2 agricultural pilot spray rating that requires an additional minimum 75 hours specific role training under the authority of a CAA Rule Part 137 or Part 141 certificate, or
- A grade 1 agricultural pilot rating that requires a minimum of 1000 hours productive agricultural operations under the authority of a CAA Rule Part 137 certificate), and
- Successfully demonstrate competency in agricultural operations to a Flight Examiner annually under the authority of a Part 141 certificate.

28 To conduct agricultural aviation an operator must hold both a CAA Part 137 Agricultural Aircraft Operator Certificate and be CAA Part 100 SMS Certified (Safety Management Systems).

29 Current recognized best practice systems are CAA Part 100 SMS and NZS:8409 2021 (The Growsafe Code of Practice).

30 Agricultural pilots are highly trained to safely operate in the low-level environment whilst maintain a high degree of situational awareness that includes preventing spray drift into sensitive areas.

Helicopter instrumentation and equipment

31 I have been asked to provide detail on helicopter instrumentation relevant to the management of spray drift, and record keeping.

32 On-board GPS systems provide guidance to the pilot for accurate application and the identification of exclusion zones and hazards.

33 The on-board GPS system provides proof of placement and identifies any areas where overspray may be an issue.

Measuring and recording wind speed and direction.

34 Some operators may use handheld anemometers. These may not return an accurate wind speed record for the actual application area.

35 Pilots are trained to monitor and assess wind speed and direction at the treatment site by observation (eg. the displacement of vegetation) and cross-referencing airspeed and ground speed (which are measured by the helicopter GPS and airspeed indicator).

36 Pilots record weather observations on their Daily Flight Records (DFR's). There is no prescribed interval for recording, but they should record conditions whenever they detect any changes in wind speed or direction.

37 The CAA rules require that onsite weather conditions (including temperature, wind speed and direction) are recorded in the pilot 'Daily Flight Records' and these records to be retained by the operator for at least 2 years.

38 NZS8409:2021 requires that spray records be kept for 3 years.

Drift management.

39 There are a range of equipment and operational techniques that can be employed to manage drift. In some instances, a single drift management mitigation item will be sufficient where there are low risks, conversely, a combination of equipment and techniques may be implemented in a high-risk situation.

40 'Shut off' valves in the centre of the helicopter boom allow pilots to work parallel with a sensitive boundary. The aircraft rotor wash directs the spray away from the sensitive boundary (there is very little rotor wash effect in the midline of the aircraft).

41 Appropriate nozzle types are selected according to the identified risk(s) of each treatment area. Coarse to very coarse nozzles are selected to minimise drift when spraying adjacent to sensitive areas.

42 Boom pressure can be used to help manage drift. Lower boom pressures result in a 'coarser' spray droplet.

43 Orientating spray booms 'straight back' reduces droplet shatter therefore reducing the quantity of 'drift-able fines' (drift-able fines are droplets less than 150 microns).

44 Restricting the boom length to 80% or less of the helicopters main rotor disc diameter minimises the effects of ‘rotor wash’ that disrupts the spray pattern causing droplet shatter. Rotor wash is most prevalent at the outer extremities of the main rotor disc.

45 In general, maintaining an airspeed range of 25 – 50 knots will minimise rotor downwash and will minimise droplet shatter. (Note the speed range will vary for different helicopter types).

46 Drift control adjuvants can be used in the spray mix to reduce drift. There is a great deal of variation in the effectiveness of various products on the market. In my experience the addition of Li1000 is a benefit in reducing drift and enhances efficacy.

47 I have been asked to comment on windspeed and drift management. In my experience, most spraying will occur when wind speeds are under 15 km/hr. I caution against setting any lower upper limit. With wind variability, a lower limit may cause a stop-start operation, drawing out the time to complete jobs.

48 Regardless of wind speed, pilots need to ensure that they carefully consider the downwind effects and ONLY spray in areas where is no risk of off target damage. Pilots are well trained in mitigating this risk.

Recording spray application and helicopter tracks

49 Most helicopters will have the ability to record continuous GPS tracks that records when the spray boom is activated. This is a single line that is buffered to account for the effective swathe width.

50 Interrogating buffered spray tracks allows identification of any areas of concern or non-compliance with a consent condition.

51 Most GPS systems also record the helicopter track when the boom is shut off. This is an effective tool when interrogating any areas of concern.

Helicopter operation and delivery

52 I have been asked to provide detail on helicopter spray operations and delivery.

53 I caution against resource consent conditions that itemise restrictions for specific flight restrictions, instrumentation or delivery as those parameters may impact on the safety of the pilot.

54 NZS8409:2021 is an appropriate risk-based standard that adequately provides for the management of agrichemicals that includes the mitigation of spray drift.

55 The 13 elements identified in the Drift Hazard Guidance Chart (Table H1) of NZS8409:2021 are universal risks that if appropriately addressed adequately mitigate the risk of agrichemical drift from any application platform including helicopters (refer appendix 1).

56 Pilots are highly trained to implement appropriate spray drift mitigation techniques. This may include operating outside some specific parameters to maintain flight safety whilst also ensuring that spray drift is appropriately managed.

Dated 03/03/2024

Tony Michelle

APPENDIX 1. NZS8409:2021 Table H1 – Drift hazard guidance chart

Factor	High hazard	Low hazard	Comment
Wind speed	Zero/very low (less than 1 m/s) or greater than 6 m/s	Steady (1-3 m/s)	Measure or estimate using anemometer or cold smoke
Wind direction	Unpredictable	Predictable, and away from sensitive areas	Use wind vane/sock or cold smoke to indicate
Relative humidity	Low RH (delta T greater than 8oC)	High RH (delta T less than 4oC)	Measure, using whirling psychrometer
Atmospheric stability	Inversion layer present	No inversion layer	Use cold smoke to indicate
Maximum height of release of product	Greater than 1.5 m above the target	Less than 0.5 m above the target	Application technique (see 5.2.5.7)
Particle (droplet) size	Less than 50 microns diameter	Greater than 250 microns diameter	Larger droplets reduce risk of drift (see M2.2)
Volatility of product	High (vapour pressure greater than 10 mPa)	Low (vapour pressure less than 0.1 mPa)	Check product label, SDS or PSC
Sensitive area	Close (less than 100 m) away	None, or more than 1 km distant	Identify on spray plan or on-site risk assessment (see G2 and 5.2.5.3)
Buffer zone	None	Yes (greater than 100 m)	Guideline only. Check HSNO approval controls for product-specific buffer zones

Factor	High hazard	Low hazard	Comment
Shelter belts	No shelter	Live shelter, greater than 3 m high and 1 m thick	Not applicable for herbicides
Physical barriers	No physical barriers	Fully enclosed non-permeable structures	Different protected cropping environments offer varying degrees of control of spray movement
Sprayer control	Unmanned	Manned	On-board applicator quicker to respond to changes in risk during operations
Toxicity/ecotoxicity	High human toxicity, or high ecotoxicity	Low or no toxicity	Use least toxic product suitable for the task

NOTE –

1) The potential drift hazard scale is given as high or low, and intermediate situations should be rated accordingly. For example, a droplet size of 150 microns diameter would represent a moderate drift hazard.
2) Some factors can be changed to reduce the hazard rating, for example, use lower volatility chemical, larger droplet size.
3) All the weather-related factors are to be assessed on-site at the time of application.
4) Toxicity of the product has been included on the chart, but hazard classification is only one indicator of toxicity and is not always sufficient. For example, herbicide selectivity could be a factor. In all cases, users should select the least toxic product that is suitable for the specific application. Check the label and product information. See 1.4 for definition of high and low toxicity.
5) 1 m/s = 3.6 km/h; 6 m/s = 20 km/h (approx.)
6) In addition to the factors listed, spray drift retardants and speed of application by boom sprayer are additional considerations for less impact.
7) Smoke should be produced from a (cold) smoke-generating device. Lighting of a fire to generate “smoke” is not acceptable practice and may give false reading for inversion layers.