

## Summary of Evidence of Dr David Russell Black for Waimakariri Irrigation Limited

1. I am a medically qualified and registered specialist in occupational and environmental medicine with extensive experience in standard setting in New Zealand and internationally. I provided rebuttal evidence for Waimakariri Irrigation Limited (WIL) dated 18 September 2020. My qualifications and experience are set out in that statement of evidence.
2. WIL runs a combined irrigation/stock water scheme in Canterbury. WIL has submitted on proposed plan change 7 to the Canterbury Land and Water Regional Plan (LWRP-PC7) which requires the impacts of land use to not exceed nitrogen loads of 5.65 mg/L nitrate-nitrogen in ground water, which is effectively half the drinking water standard, currently set at 11.3 mg/L.
3. WIL has not sought to challenge the proposed limit; however, Christchurch City Council is proposing a lower standard. In my opinion this is contrary to the evidence-based position adopted by the World Health Organization (WHO).
4. The relevant standard in New Zealand for nitrate-nitrogen levels in drinking water is the "Drinking-Water Standards for New Zealand 2005 (Revised 2018)".
5. The issue in this case is the maximum allowable value (MAV) of nitrates which are expressed as 50 mg/L for nitrates ( $\text{NO}_3$ ); there is also consideration of nitrites expressed as 0.2 mg/L as  $\text{NO}_2$  for long-term exposure. For short-term exposure nitrites at 3 mg/L are permitted. There is also a limiting standard for nitrate and nitrite to protect against methemoglobinemia in bottle-fed infants.
6. Dr Chambers from the University of Otago acknowledges that the current WHO recommendation of 11.3 mg/L nitrate-nitrogen ( $\text{NO}_3\text{N}$ ) is based on the short-term risk of infantile methemoglobinemia. I agree with that. However, Dr Chambers also argues that endogenous nitrosation - a process of converting organic compounds into nitroso derivatives - is a mechanism by which he suggests that ingested nitrate could be linked to cancer. That view is no more than speculative, not widely accepted and has not influenced WHO in setting drinking water standards.
7. The application of epidemiological information to the setting of health-related standards is a specialised and intricate task, in which I have considerable professional experience.
8. Current best practise and standard setting is to rigorously base standards on established science. Proven and replicable effects are used as a starting point. Standards then usually apply a safety margin which is to consider such factors as individual biological variation and errors in estimation. This is clearly the approach which has been taken in the establishment of drinking water standards based on the WHO approach, including the NZ 2018 MOH document.
9. It is also common good practise for users of a standard to set an "action level" which is usually a level below the standard which is a target to improve strict compliance with the actual standard. That approach is neither precautionary nor prudent avoidance; it is an established technique for achieving compliance with the actual Standard. Accordingly, I regard the approach proposed in LWRP-PC7 of using half of the standard in this way as good practice.

10. There is a significant public health benefit from ensuring that standards are consistent and complied with and there is a contrary disbenefit in the suggestion of varying 'pseudo-standards' such as that proposed in evidence provided by Christchurch City Council.
11. On that basis, it is my strong recommendation that the properly established and internationally compliant standards for nitrates and nitrites in drinking water in New Zealand be set as the requirement for the LWRP-PC7 and that any suggestion of a separate 'pseudo-standard' be rejected on the basis that it has no proper basis in terms of established causation and therefore has poor scientific integrity.

**Dr David Black**

**11 November 2020**