Report on biohazard issues (specifically zoonotic infection risks) related to the proposed Ballarat Saleyards

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A. Qualifications and experience

I hold Bachelor of Veterinary Science and Master of Veterinary Science degrees from The University of Melbourne and a Doctor of Philosophy degree in veterinary virology and immunology from Cornell University, New York.

I am a registered veterinarian in the state of Victoria and a Fellow of the Australian Veterinary Association.

On completing my veterinary training (1968) I spent 3 years in rural practice in Victoria mainly involved with dairy cattle. I then completed my two post-graduate degrees in virology and immunology before being appointed as a Post-Doctoral Fellow conducting research at London University.

One my return to Victoria in 1977 I spent 11 years working for the then Department of Agriculture at the Veterinary Research Institute overseeing diagnostic and research activities in animal diseases, including zoonoses.

From 1987 to present I have been working in university teaching and research in New Zealand (1987-1998) as Professor of Veterinary Public Health and at The University of Melbourne (1998-present) as Professorial Fellow.

I have published in the international peer-reviewed literature over 100 papers on veterinary and zoonotic infectious diseases, co-authored a book, "Zoonoses in New Zealand", and served on numerous government committees concerning risk assessment of introduction and transmission of infectious diseases of livestock including zoonoses.

I am the Chair of the Scientific Advisory Committee of the Centre of Excellence for Biosecurity Risk Analysis at The University of Melbourne (2013-present).

Since 2006 I have consulted for international organisations on the control of infectious diseases in over 25 countries (Food and Agriculture Organisation of the UN, WHO, World Bank, Asian Development Bank, AusAID).

B. Area of expertise relevant to this report

I am a registered veterinarian with expertise and many years experience in the diagnosis and control of infectious diseases, including zoonoses, in livestock and risk assessment for introduction and transmission of infectious diseases.

C. Instructions

I received Instructions as follows from Harwood Andrews by letter dated 9 June 2015.

> "On 26 May 2015, the Panel hearing the matter issued directions for the conduct of the hearing. Those directions included Direction 20 requiring RLX to address a number of specific matters including, relevantly, Biohazards referred to in submissions which are mainly animal, but do include a submission in relation to human health
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> The only specific pathogen identified in submissions is Q fever (see enclosed submission from Alma Clark). Other submissions express general concern over the risk of infection to humans and animals, in particular horses (see, by way of example, enclosed objections from Brenda Beck, Kevin Howard and Darren Earles).
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> Please can you provide a written statement which addresses:
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> 1. Whether the CVLX poses a risk to human or equine health either:
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> a. In its current location; or
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> b. In its proposed location;
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> 2. If so,
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> c. What is the extent of the risk at the proposed location; and
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> d. Whether the risk to human health at the proposed site is greater or lesser than at the current location?
>
> 3. Can the extent of the risk at the proposed location be reduced or managed by appropriate measures? If so, what are those measures?
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> A copy of the plan showing the relationship between the proposed site and Miner Rest can be found at Appendix 2 of the enclosed 'Summary Response to Development Plan requirements' document (enclosure 3). An outline of the proposed waste management regime for the site can be found in the enclosed Water cycle management report (enclosure 4). Copies of wind roses prepared by ERM based on BOM data are enclosed (enclosure 6). If you require or prefer the raw BOM data, please let me know and it can be provided.
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> We attach a copy of Victorian Planning Panels Guide to Expert Evidence in case you are asked to give evidence and ask that you review its contents and present any evidence consistent with the principles contained in that document. To be clear, you are being briefed for an independent opinion, and you should evaluate the material as such without recourse or regard to our client's position in the matter."

D. Report

General considerations about source and transmission of infectious diseases in the context of the proposed saleyards.

A place where large numbers of animals are brought together from numerous other locations has the potential to bring with those animals infectious agents (such as viruses and bacteria) that are already present in those other locations.

The infectious agents may arrive in infected animals (which may be infected but showing no clinical signs of disease) or on contaminated vehicles or contaminated feed and bedding materials.

Infectious agents arriving in animals may be shed by those animals by a number of routes, essentially in exhaled breath, in faeces, urine, milk, uterine discharges (foetal fluids at and for some days following birth), other bodily discharges (such as saliva) or by biting insects.

When shed from the infected animals, or when arriving on the site on contaminated feed or bedding materials, the infectious agents must be able to survive in the external environment for long enough to be transmitted to a susceptible host for successful transmission to occur. For the bacterial and viral agents of interest, they do not multiply in the external environment (outside the animal) and, depending on the particular agent, they gradually lose their infectivity over time. For some agents most infectivity is lost in a matter of a day or two, for others this may be months.

The greatest risk of transmission of infectious agents between infected and susceptible animals (including those agents that can be transmitted from animals to humans) is when the two are in close physical proximity (a couple of meters) or when there is direct physical contact by the susceptible individual with infected material shed from the infected animal (handling the animal or material contaminated by the animal).

Risk of a susceptible animal becoming infected also depends of the dose of infectious agent it is exposed to. This varies with the particular infectious agent, being as little as 10 infectious particles for Q fever or needing several thousand infectious particles for many other agents.

For infections to be a concern therefore, it is necessary for several things to occur. There must be:

a) A source of infection (e.g. infected animal)
b) The infected animal must be shedding the infectious agent
c) The infectious agent must be able to survive in the environment for a long enough time and at a high enough level of contamination to infect another susceptible animal
d) The infectious agent and the susceptible animal must be close enough for transmission of the agent to occur.

Considering a sale-yards situation where many animals are brought together from numerous other locations, it must be expected that, even if all the animals entering the sale-yards are clinically healthy, some may be carrying infectious agents from their place of origin. The larger the number of animals entering the sale-yards and the greater the number of source locations, the greater the chance that some will be carrying an infectious agent. But these will only be the infectious agents that are normally present (endemic) in the source locations of those animals.

The next consideration is whether the infected animals will be actively shedding the infectious agent when they are in the sale-yards. This will vary with the infectious agent. For example, for the agent of Q fever, the usual host animals are ruminants such as cattle, sheep and goats. Once an animal is infected it may remain infected for much of the remainder of its life even though it is showing no signs of disease. However, shedding of the Q fever agent from the infected animal in faeces, milk and urine is very small and it is the massive shedding of organisms during the birth process and in uterine discharges for the week or so after birth that is the main source of transmission of infection to other animals including humans. Therefore if the cattle and sheep entering the sale-yards are either non-pregnant, or pregnant but not giving birth in the sale-yards, then even if they were carrying Q fever infection, they would not be a major source of infection risk to other animals or to contaminating the environment.

This situation may be contrasted with the zoonotic infection risk of leptospirosis. Cattle and sheep may be infected with the leptospiral agent, appear clinically normal, but be shedding the agent continuously in their urine. The agent survives for many weeks in water, particularly if alkaline, and may be transmitted through water runoff to infect susceptible animals if they come into contact with infected water and have breaks in their skin or get splashes onto mucous membranes. However, long experience with this infection in Victoria indicates that human infection occurs only in those who have direct physical contact with urine from infected animals, almost always cattle. Human infections are therefore seen in dairy farmers and in some abattoir workers.

I won't continue with specific examples but would make the points that the chance of animals that are infected with agents that are endemic in Victoria entering the sale-yards is high. However, whether or not they shed the agents while in the sale-yards will depend on the class of animal (pregnant or not, birthing or not) and the type of infectious agent. Whether the agents that are shed into the sale-yard environment build up to such a level that they present an infection risk to areas surrounding the sale-yard, depends on management factors in the sale-yard such as collection and treatment of waste water, collection and treatment of solid waste (e.g. manure, soiled bedding), dust suppression to prevent potentially infected dust being blown off the site and insect control to prevent buildup and dispersal of biting insects and flies that may be contaminated with infectious material.

Addressing the specific issues in the Instructions

1. *Whether the CVLX poses a risk to human or equine health either:*
    a. *In its current location*
    b. *In its proposed location*

Accepting that animals coming into sale-yards have the potential to be carrying infectious agents that may infect humans then there must exist a potential risk to human health. This potential risk will exist at both locations. However the main difference in size of the risk will be to people in the area surrounding each location. The risk to those people will vary on how far removed they are physically from the location (less than 250 m at the current location and at least 850 m at the proposed location) and how well the water and solid waste, dust and insects are managed at each location.

I have not visited either location but have read carefully the provided documents mentioned in the Instructions and am satisfied that the chance of infectious material leaving the proposed site, if it is constructed and managed as proposed, is significantly less than at the current site. There are apparently ongoing challenges with managing water and solid wastes at the current site in a location in relatively close proximity to dwellings.

Of particular relevance in this regard are the details of the Water cycle management report, including the washing of surfaced yards and the application of water for dust suppression as needed in un-surfaced yards. Treatment of waste water is expected to adequately manage any infectious content of potential concern and control of runoff even in flood conditions provides further confidence in significant reduction of potential risk.

With respect to potential human health risk it is my view that the proposed site is of much lower risk than the current site due to its location (bounded on two sides by road highways with ready access of vehicles without the necessity for them to pass through built up areas), the buffer of irrigated land surrounding the constructed yards, the greater distance from dwellings, the comprehensive structural features and management plan for handling liquid and solid waste material and the design and structure of the yards and other facilities, including truck washes, which facilitates easy cleaning.

With respect to equine health, I do not consider either site to be of significant risk to equine health. The only potential risks of infectious agents from cattle and sheep to horses that I am aware of are such enteric agents as Salmonella and cryptosporidia, which may be spread in faeces. While there may be some risk of this occurring in the current site, although it is not clear to me how close any horse farms are to that site, the containment and treatment measures at the proposed site put the risk of transmission into the vanishingly small category. Essentially raw faeces from cattle or sheep would need to be present on pasture grazed by horses for transmission to occur.

2. *If so,*

    a. *What is the extent of the risk at the proposed location; and*

    b. *Whether the risk to human health at the proposed site is greater or lesser than at the current location?*

It is my view that the risk to human health is likely to be low at the proposed location and will essentially be born by those working with the animals and coming into close contact with them and their wastes on a daily basis and, to a lesser extent, by those visiting the sale-yards.

It is hard if not impossible to put a numerical value on the potential risk of human infection but a comparison with visiting or living on a farm in Victoria might be useful. The much larger number of animals passing through the sale-yards and the fact that these are being drawn from many different locations would act to make the risk higher than on a farm with a population that is essentially static. However during calving and lambing seasons the risk would be much greater on farms due to the potential for shedding infectious agents in birth fluids. Also, unless vaccination of the cattle for leptospirosis has been undertaken, visiting a milking shed (particularly of the herringbone type) carries a real and well-recognised risk of exposure to infected urine.

I do not have historical information for reported cases of human infection arising from the operations of the sale-yards at the current location but if these were available they might allow some quantification of risk.

Given the proposed management and structural plans for the proposed facility, the potential risk to the surrounding population would be very much less than for those at the sale-yards, and less than for those living in the vicinity of the current location.

I consider the risk to human health, even for those working at the proposed facility, to be lesser than that at the current location. My assessment is contingent on the expectation, as mentioned in the proposal documents, that the yards and races will be designed and constructed to facilitate easy movement of animals, surfaces can be more readily cleaned and waste material can be managed safely. That means workers should be operating in a cleaner environment and not needing to come into close contact with animals as much as in the current location.

All these measures that mitigate the risk to people working at the proposed location also mitigate any potential risk to those people in the surrounding area. That potential risk is mitigated further by the water and solid waste management procedures and structures planned to prevent water runoff from the proposed facility to the surrounding area.

The proposed site appears to be eminently suitable for saleyards in terms of infectious risk to the surrounding area and the management plans and structures proposed deal adequately with potential risks.

3. *Can the extent of the risk at the proposed location be reduced or managed by appropriate measures? If so, what are those measures?*

From my reading of the supplied documents, it is apparent that many design and management measures are already being taken that will reduce and manage the potential risk.

It may be that some of the animals entering the facility (prime and store cattle and sheep) may be pregnant although it is expected that the proportion that are would be small. Therefore the risk of increased shedding of infectious agents around the birthing process or spontaneous abortion will be small.

Only clinically healthy animals should be brought to the sale-yards. While this does not eliminate all potential sources of infection it would remove several zoonotic agents (such as 'contagious ecthyma' or 'Orf" of sheep) and reduce the potential risk.

Design of the races and holding yards to facilitate easy animal movement without the need for close human interaction reduces the potential risk by distancing the workers from any potentially infected animals (as well as reducing risk of physical injury).

Regular cleaning of yards, removal of potentially infected solid waste and appropriate processing of waste reduces the chance of build up of infection in the yards. Special attention should be directed to removing and disposing of products of abortion should such an event occur with any animal.

It is proposed to collect solid waste and hold on site for some weeks before transporting off site to a commercial composter or garden processor. Composting will inactivate infectious agents of concern, including the hardy spores of the Q fever agent. If composting is not done on site then safe transport (no spillage along roadways especially if passing through residential areas) of solid waste to the off site composter, who is aware of potential infection risks and capable of composting adequately, must be ensured.

Collection and treatment of water waste and runoff as described is a major risk-reduction measure both for infection control on the site as well as avoiding spread to areas surrounding the site. Proper ongoing management of the water cycle and treatment process will be critical to ensuring this risk reduction measure is maintained.

Wetting down yards as proposed to reduce dust is an important measure to reduce the risk of wind-blown infectious agents on dust. From my reading of the wind rose documents supplied, it appears that southerly winds that blow across the proposed site towards Miners Rest are not uncommon.

There is a small but real risk of exposure of workers to Q fever, particularly the stockmen who will unavoidably be in close contact with animals at times. A human vaccine is available and required for abattoir workers in this state. It is recommended that staff at the facility be offered Q fever vaccination to protect their own health. There is not a risk of human-to-human transmission off the site.

Transmission of infection on soiled clothes is possible for many infectious agents and it is recommended that some consideration be given for at least those people working directly with animals having “work clothes” that remain on site and only wearing their own clothes off the site. An alternative approach to reducing the risk of transmission off site by workers is to require hand and boot washing before leaving the site.

This concludes my report.

Colin R Wilks

16 June 2015

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Present professional appointments: Professorial Fellow, School of Veterinary Science, The University of Melbourne

Director, Colin Wilks and Associates Pty Ltd. International veterinary consulting.

Tertiary Education: BVSc, The University of Melbourne, 1968

MVSc (Virology), The University of Melbourne, 1972
PhD (Virology), Cornell University, NY, 1975

Employment Record:

2006 – present	International consultant in animal health, mainly with FAO, in several African, South East Asian and Central Asian countries
1999 – present	Professorial Fellow in Veterinary Public Health and Virology, School of Veterinary Science, The University of Melbourne
1998 – 1999	Head, Microbiology Department, Victorian Institute of Animal Science, Department of Primary Industries, Attwood 3049 Victoria, Australia
1995 – 1998	Professor and Head, Department of Veterinary Pathology and Public Health, Massey University, New Zealand
1990 – 1995	Professor of Veterinary Public Health, Massey University
1987 – 1990	Senior Lecturer, Veterinary Virology, Massey University
1977 – 1987	Senior Veterinary Research Officer (Immunology) and Acting Director, Veterinary Research Institute, Parkville, Victoria During this time (1982-1983) I was Visiting Scientist, Plum Island Animal Disease Center, NY.
1976 – 1977	Post-doctoral Research Fellow (Virology), Royal Veterinary College, London University, UK
1968 – 1971	Private veterinary clinical practice in Gippsland, Victoria

Other Information:

My professional career includes a short period in rural veterinary practice and then, following postgraduate training at Melbourne and Cornell universities, periods of 12 years in government veterinary service (1977 – 1987 and 1998 – 1999), 21 years in university teaching and research (1987 – 1997 and 1999 – 2010) and, since 2006, international consulting related to animal and public health.

International consultant; As director of my own consulting company, I perform a range of consulting work, including for government agencies in Australia and

New Zealand related to zoonoses, food borne diseases, biosecurity and risk assessment for the import and export of animals and animal products, and for the FAO, WHO and World Bank related to H5N1 avian influenza and development of animal health services including surveillance and laboratory networking.

Over the past 5 years I have spent about 4 months per year as a consultant for FAO in avian influenza working in Rome HQ and on missions in Egypt, Iran, Ukraine, Ethiopia, Nigeria, Nepal, Bangladesh, Indonesia, Uzbekistan, Turkmenistan, Tajikistan and Kazakhstan. Missions have been to evaluate country preparedness and risk assessment for introduction of H5N1 HPAI, review of the performance of FAO projects, feasibility studies, and training.

International consultancies in last 10 years:

2006	**January, February, June and November/December** at FAO headquarters Rome, working on Global Programme for HPAI. Included participating in joint mission with WHO to Egypt and Iran, and mission with UN System Coordinator for Avian and Human Influenza to Ukraine.
2007	**January and February** FAO Rome (internal reviews of HPAI response, donor document preparation). **March,** Egypt, Ethiopia, Nigeria as team member for First Real-Time Evaluation of FAO's response to H5N1 avian influenza. **June,** Crisis Management Centre FAO Rome, trainer in orientation for rapid response to Animal Health Emergencies.
2008	**January and February** FAO Rome. **August, December** World Bank ALIVE mission on laboratory networking in Africa.
2009	**January February,** completion of World Bank ALIVE feasibility study. **June, Uzbekistan** (FAO training course in epidemiology, review contingency plan and legal framework). **August, Turkmenistan,** (FAO training course epidemiology and HPAI response). **October, November, Tajikistan and Kazakhstan (FAO** epidemiology training, review and assist implementation of diagnostic laboratory resources, present at Regional Meeting in Astana).
2010	**January, February** (FAO Bangladesh and Indonesia preparation of Animal Health – National Medium Term Priority Plans) **June July** (FAO Kazakhstan and Turkey, review and assist with preparation of HPAI contingency plans)
2014-2015	**July-October 2014, Jan-Feb 2015, Cambodia** (Asian Development Bank, Curriculum development and teaching at Royal University of Agriculture)

Academic career; At Massey University in New Zealand and at Melbourne University, I have been active in teaching and in research on infectious diseases of veterinary and public health significance. The research has included involvement with international students and the supervision of the research component of their degree programs in Ethiopia, Indonesia, Vietnam, Lao PDR, Peru and China.

My present responsibilities at The University of Melbourne include teaching in veterinary virology, teaching and co-ordinating an integrated course in veterinary public health that extends over the 4 years of the veterinary professional program, supervision of postgraduate students, and associated administrative and management duties.

I have been active on the editorial committees of several veterinary journals and for the 5 years up to December 2004 was Scientific Editor of the Australian Veterinary Journal.

I established a new Master of Veterinary Public Health degree at Melbourne University to provide advanced training for veterinarians to enhance responses to emergency disease situations.

I chair the Scientific Advisory Committee of the centre of Excellence in Biosecurity Risk Analysis at Melbourne.

I have provided expert contributions to government committees in New Zealand and Australia, particularly in zoonotic disease risks (e.g. BSE Expert Science Panel in New Zealand) and risk assessment of protocols for importation of animals and animal products (e.g. pug meat import risk assessment).

Government veterinarian; During my 11 years with the Victorian Department of Agriculture in Australia I headed the section involved with serological and microbiological diagnosis of diseases of livestock and providing laboratory support to the successful brucellosis and tuberculosis eradication program. My laboratory made the initial diagnosis of HPAI (H7N7) in commercial poultry in 1985 and produced the reagents and conducted testing to support eradication and confirmation of freedom. We also identified leptospirosis as a significant occupationally associated zoonosis in a temperate area and developed vaccination programs to protect farm workers by vaccinating cattle. Our testing to confirm absence of various diseases permitted the rapid expansion of international export of livestock from Australia to several countries including China where I conducted a short mission to facilitate entry of dairy cattle.

Publications:

I have published one handbook on veterinary and medical aspects of zoonotic diseases in New Zealand ("Zoonoses in New Zealand" by Wilks CR and Humble MW), over 100 scientific papers in refereed journals, numerous book chapters, conference abstracts and government reports.