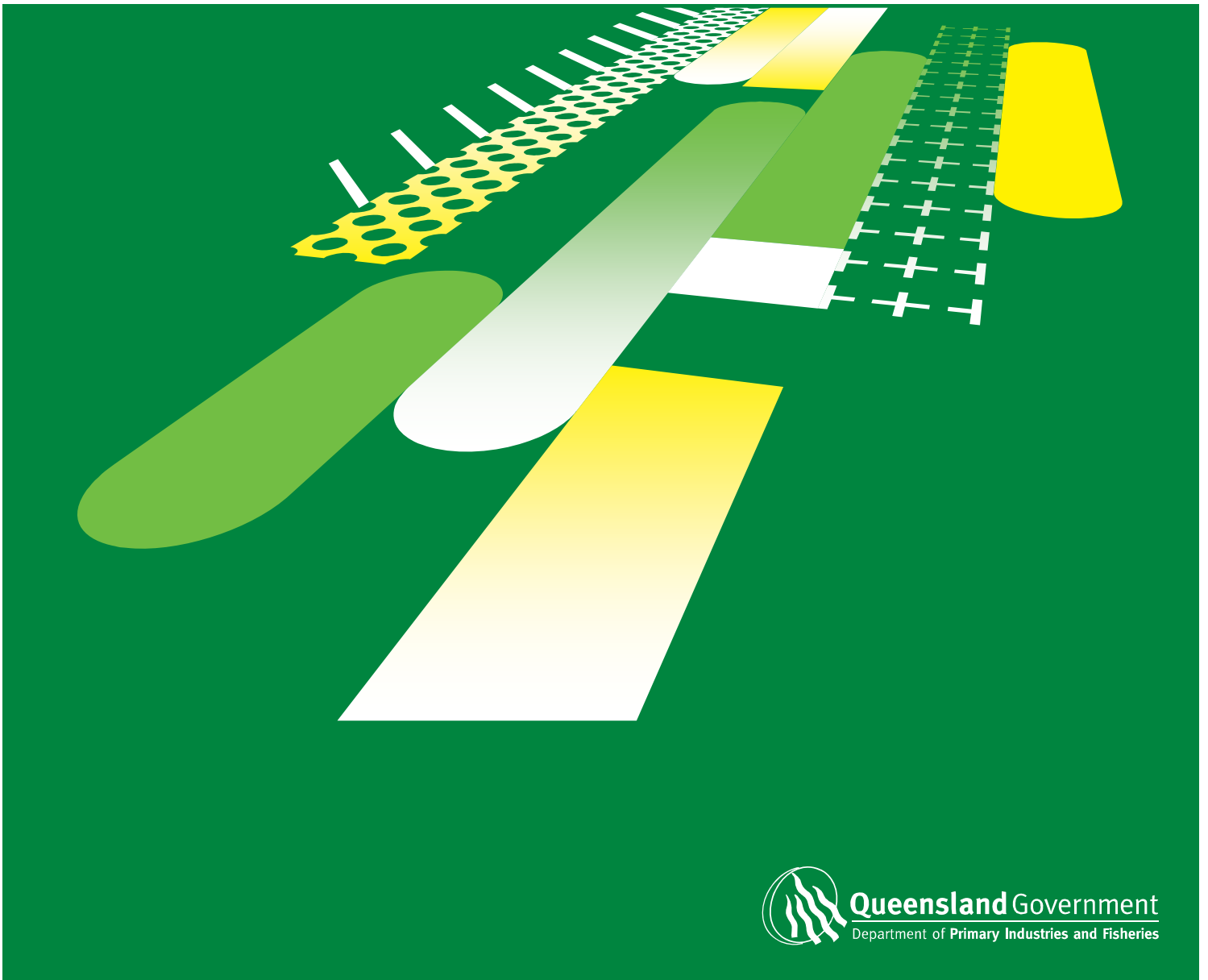


Guidelines for veterinarians handling potential Hendra Virus infection in horses



Version 3 April 2009.

Hyperlinks

Hyperlinks are used throughout these Guidelines to take you to the latest copy of relevant references contained within this document, and on both departmental intranet and internet sites, and external sites (e.g. [Stock Act 1915](#)). To activate the hyperlink, place your cursor over the hyperlink, press the control key on your keyboard and left click on your mouse.

If you have a paper copy of this document, the complete path for references is included under [related reference documents](#).

Note: non- Primary Industries and Fisheries personnel will not be able to access references on the Primary Industries and Fisheries intranet.

Summary of important changes from previous version of this document (Version 2)

Section 4.2 Update of epidemiology section

Section 4.8 Reference to paper - Initial experimental characterisation of HeV (Redland Bay 2008) infection in horses - D Middleton, CSIRO Australian Animal Health Laboratory (AAHL)

Section 5.1 Update of Case Definition

Section 5.6.5 Update of sampling section

Section 6 Update of limited necropsy approach

Appendix 1 Hendra Virus Incident Summary table.

Most changes reflect findings from the paper 'Initial experimental characterisation of HeV (Redland Bay 2008) infection in horses' - D Middleton, CSIRO Australian Animal Health Laboratory (AAHL) in addition to language and format changes throughout the document (editing changes).

Appendix 1 is an update summary of Hendra cases to date – this data was previously referenced in Section 4.2 (epidemiology), but has been updated and expanded.

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1. Purpose

These Guidelines have been developed to support a professional risk management approach by veterinarians when investigating a disease situation where Hendra Virus (HeV) is a suspect diagnosis in a horse or horses. The serious zoonotic nature of HeV requires special precautions to be taken.

These guidelines recognise that investigation and management of HeV reports will continue to be a joint approach between private veterinary practitioners and Biosecurity Queensland, Primary Industries and Fisheries. It is assumed that private veterinary practitioners will continue to investigate suspect cases of HeV and take appropriate samples but will consult with Biosecurity Queensland about highly suspect cases (see Case definitions, section 5.1).

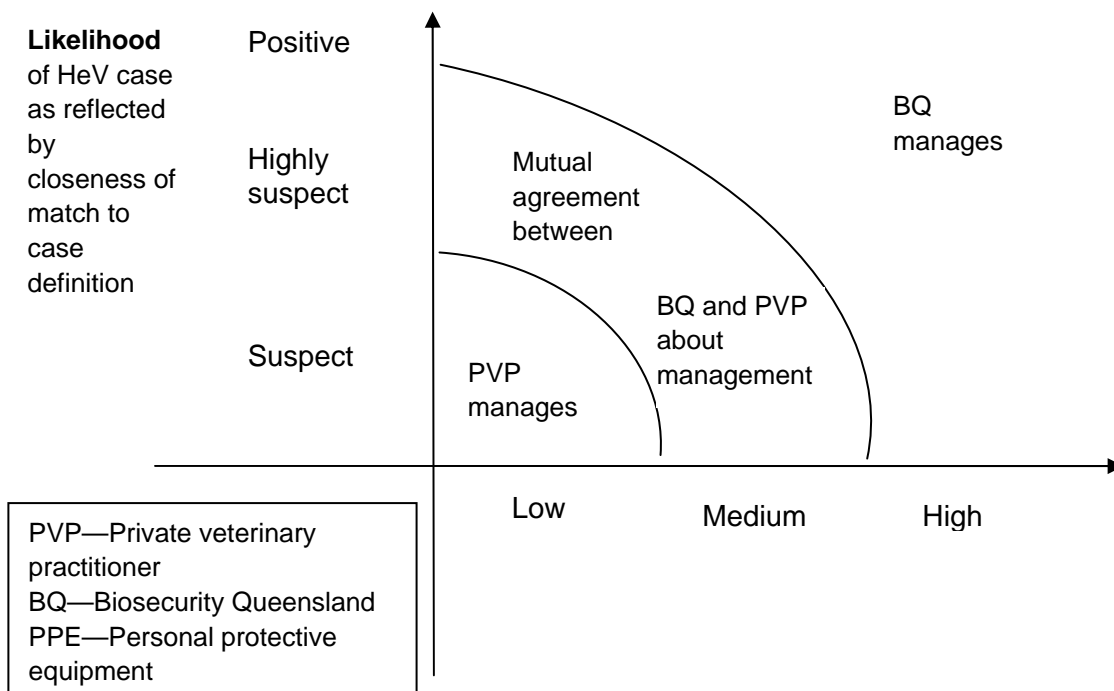
There may be circumstances where a private veterinary practitioner may not be in a position to manage the level of associated risk and in these cases the private veterinary practitioner may need to pass the case to Biosecurity Queensland. This will need to occur with consultation between the private veterinary practitioner and Biosecurity Queensland as discussed below.

This document does not address day-to-day work practices and any changes to those practices that the veterinary profession may introduce as a result of HeV incidents and new information. The document concentrates on investigation of suspect and highly suspect cases of HeV in horses. It can be used, as appropriate, in supporting the development of infection control procedures for routine veterinary practice.

These Guidelines will be updated as more knowledge and information becomes available.

2. Scope

The following diagram represents the joint management of HeV reports between private veterinary practitioners and Biosecurity Queensland. It recognises that consultation will occur between private veterinary practitioners and Biosecurity Queensland and that ongoing management of a case may pass from one to the other. The point at which a private veterinary practitioner passes a case over to Biosecurity Queensland will vary with individual veterinarians and the situation being investigated.



For the purpose of this document, it has been assumed that:

- all suspect and highly suspect HeV cases will be notified to Biosecurity Queensland as required under legislation. Notification to a government veterinary officer can be made by contacting 13 25 23 (business hours) or 1800 675 888 (all hours), or through direct contact with a government veterinary officer.
- suspect cases will be investigated by private veterinary practitioners as part of normal practice using these guidelines as a reference
- private veterinary practitioners will normally consult with Biosecurity Queensland about highly suspect cases and that mutual agreement will be reached whether the private veterinary practitioner continues with the case or Biosecurity Queensland takes it over
- Biosecurity Queensland will manage confirmed HeV cases
- Infection control procedures will be applied by the veterinary profession to manage horses in the pre-clinical phase that may be excreting Hendra virus but not showing any clinical signs.

These Guidelines include information on:

- the use of the case definition of HeV in horses to describe two categories of sick horse—suspect and highly suspect
- notifications required
- biosecurity practices to prevent transmission of infection to people and other horses
- advice on safe entry and exit from a premises
- advice on sample taking from both live and dead horses
- advice on sample dispatch
- biosecurity advice to horse owners/carers.

This document is primarily for use for the investigation of suspect HeV cases by private veterinary practitioners and forms the basis for the investigation of highly suspect cases. A private veterinary practitioner can proceed with the investigation of highly suspect cases but should first consult Biosecurity Queensland unless fully familiar with appropriate biosecurity and sampling practices.

3. Procedure for a suspect Hendra virus—summary

Following is a summary of the tasks required when investigating a horse that may have HeV. Steps 1–9 are described in more detail in section 5 of this document.

1. To make an initial case assessment, **VIEW THE CLINICAL SIGNS** of HeV.
2. If a case of HeV is suspected, **NOTIFY DPI&F** on 13 25 23 (business hours) or 1800 675 888 (any time) or by direct contact with a government veterinary officer.
3. If HeV is suspected before you enter the property, **PRECAUTIONS MUST BE TAKEN**. These precautions include a possible sequence of actions, the use of disinfectants and entry and exit procedures.
4. If HeV is suspected before you enter the property, **TAKE WORKPLACE HEALTH AND SAFETY PRECAUTIONS INCLUDING USE OF PERSONAL PROTECTIVE EQUIPMENT (PPE)**. If you are the veterinary practitioner in control of the situation you must also ensure that the risk of injury or illness is minimised for workers and others who are assisting you.
5. If you suspect HeV during the examination of an animal, **TAKE IMMEDIATE STEPS** to minimise the risk and exposure to yourself and others.
6. **TAKE DUE CARE WHEN TAKING SAMPLES.**
7. For guidance on the **DISPATCH OF SAMPLES**. Dispatch should be to a Queensland government laboratory and not to a private laboratory.
8. **PROVIDE BIOSECURITY ADVICE TO YOUR CLIENT.**
9. **IF A SUSPECT OR CONFIRMED CASE HAS DIED** additional steps should be taken.
10. **REPORT ALL DIAGNOSTIC RESULTS TO PRIMARY INDUSTRIES AND FISHERIES**
11. **OBTAIN ADVICE FROM PRIMARY INDUSTRIES AND FISHERIES** on 13 25 23 or by contacting 1800 675 888 for further information about any of these procedures.

4. Background information

4.1 General

Hendra virus (HeV) was first isolated during 1994 when it occurred in a stable in the suburb of Hendra, Brisbane. Early names included acute equine respiratory syndrome and equine morbillivirus. However, following characterisation of the virus, it is now termed HeV. HeV and Nipah Virus form the genus *Henipavirus* in the family *Paramyxoviridae*.

It is known that sporadic ‘spillover’ of HeV from flying foxes to horses occurs. The factors associated with spillover events are not yet fully understood and research is ongoing.

HeV has the potential to be a serious zoonotic disease for which stringent biosecurity and safety measures are necessary. There are important public health and workplace health and safety issues that require consideration. Careful risk management of the situation, safe work practices and personal protective equipment is required (see section 5.5 [Safety precautions](#)) to manage

exposure to risks and veterinarians should ensure the workplace health and safety and of themselves, their workers and others.

While much is now known about HeV, the scientific information available for HeV is not complete and there may be insufficient scientific knowledge to answer some questions that are posed. As the consequences of HeV infection can be devastating for both horses and humans, a conservative 'precautionary principle' approach should be taken whenever uncertainty exists.

Given the potential consequences of HeV, it is imperative that suspect cases be notified and investigated (see 5.1 Case definition, 5.2 Differential diagnoses and 5.3 Notifications required). As is always the case when dealing with a disease situation, it may not be clear from the outset that HeV is involved. However, if HeV is included in differential diagnosis then, as a precautionary measure, the veterinarian should implement the safety precautions discussed in these guidelines until such times as HeV infection can be excluded.

Veterinarians who treat horses should:

- assess their existing veterinary routines and work practices so that individual assessment of horses for zoonotic diseases and prevention of potential transmission of these diseases from infected horses to both humans and other horses is built in to normal procedures
- develop plans for responding to a potential Hendra case including the minimisation of risk to themselves, their workers and others (including clients)
- review their infection control procedures as these will provide the best protection during the pre-clinical phase of HeV infection and to ensure the routine cleaning and disinfection of equipment (e.g. stomach tubes, endoscopes, dental equipment etc) between horses. (Refer to Australian Standard 4815 for more information about the reprocessing of instruments and equipment)

Note - the report "Initial experimental characterisation of HeV (Redland Bay 2008) infection in horses" authored by D Middleton, CSIRO Australian Animal Health Laboratory (AAHL) indicates that infected horses have a potential to excrete virus through nasal secretions at least 2 days before showing any clinical signs. Appropriate infection control procedures should be applied in the light of this finding as it appears to be the primary defence in the pre-clinical phase where horses may excrete HeV virus but still appear clinically normal.

4.2 Epidemiology

Epidemiological information about HeV is incomplete and remains the subject of ongoing research. This section will be updated as new information becomes available. Factual information about the virus is shown below.

At the time of writing, HeV has been confirmed in a horse or horses on a total of eleven premises since 1994. Ten of these have occurred in Queensland and one in northern NSW. The known detections have occurred on or east of the Great Dividing Range from Cairns to northern NSW but this cannot be assumed to be the extent of the range of HeV as there remains a potential for HeV in horses wherever flying foxes are found. For further details, refer to Appendix 1.

Location	Date
Mackay, Queensland	August 1994
Hendra, Queensland	September 1994
Cairns, Queensland	January 1999
Cairns, Queensland	October 2004
Townsville, Queensland	December 2004
Peachester, Queensland	June 2006
Murwillumbah, New South Wales	October 2006
Peachester, Queensland	June 2007
Cairns, Queensland	July 2007
Redlands, Queensland	June 2008
Proserpine, Queensland	July 2008

- Flying foxes are the natural reservoir of Hendra and Nipah viruses. HeV is present in flying fox populations in Australia and Papua New Guinea. Nipah virus is not known to be present in Australia but is present in South-East Asia and extending into Indonesia.
- The mode of HeV transmission between flying foxes, and from flying foxes to horses, is not yet known. However, virus has been identified in the birthing fluids, placental material and aborted pups of flying foxes. Experimentally, HeV has been isolated from flying fox urine and there are recent reports of isolation of HeV in wild flying fox urine. The closely related Nipah virus in Malaysia has been recovered from flying fox urine and saliva.
- Experimental studies in horses have identified HeV in respiratory secretions, saliva and urine. The full cycle of infection in flying foxes, and the factors that facilitate 'spillover' of the virus to horses is not fully understood and research is ongoing.
- Polymerase chain reaction (PCR) testing conducted during the recent response (2008) identified HeV genetic material in blood, nasal secretions and a wide range of body tissues indicating that virus is likely to be widespread throughout the body and fluids of an infected horse.
- **An experiment conducted by AAHL (2009) using the Redlands 2008 HeV isolate demonstrated that by the time that a horse is showing clinical HeV signs, HeV virus is systemically widespread throughout the body and body fluids.**
- **The AAHL experiment also demonstrated that a horse can potentially excrete HeV through nasal/ naso-pharyngeal secretions at least 2 days before showing clinical signs.**
- The first clinical signs detectable in the AAHL experiment were an increase in body temperature and heart rate, demonstrated at least 2 days after the first nasal swabs tested PCR positive.
- It is known that the HeV virus uses a cell surface glycoprotein, ephrin B2, as a cell receptor and that this receptor has a widespread cellular distribution, especially in vascular endothelial cells.
- This accounts for the commonly observed outcome of HeV infection, that of systemic involvement of endothelial cells. Microscopically, lesions of vascular damage and vasculitis are observed and these lesions are consistent with histopathological changes observed in cases of HeV infection. Technically, these are not clinical signs but through the widespread and serious damage to capillary endothelium they certainly make a large contribution to the development of clinical signs and gross post-mortem changes observed.
- HeV is recognised as causing respiratory and neurological signs in horses. The 2008 Redlands incident demonstrated the primary presenting clinical signs of HeV infection as neurological symptoms. Neurological signs had been seen with previous cases, but not as the primary presenting sign.

From the disease pathogenesis perspective, it is reasonable to assume that underlying virus-induced damage to vascular endothelium, and the subsequent vasculitis, is playing a major role. In a simplistic sense the predominant clinical presentation (colic, respiratory, neurological etc) may depend on which organ system is sustaining severe and compromising endothelial damage.

- The AAHL experiment using the Redlands 2008 HeV isolate demonstrated little genetic change in the virus structure and suggested that HeV infection could generate a wide spectrum of clinical signs (including respiratory and neurological) and the signs seen in any case may relate to the route of infection and the size of the infective dose.
- **The first clinical signs seen during the AAHL experiment were an increase in body temperature and heart rate and a discomfort expressed by weight shifting between legs. This progressed to depression and other signs already associated with clinical HeV infection (refer 5.1).**
- In the five identified 'spillover' events to December 2004, there was a temporal association between infection in horses and late pregnancy/birthing of flying foxes – these cases occurred between August and January, which matches the late pregnancy and birthing season of three of the four Australian flying fox species. However, the prevalence of infection in individual flying fox populations may vary from year to year, and a reliable method for prediction of the high-risk period within this time is not available.
- In the more recent identified 'spillover' events, the temporal association with late pregnancy/birthing is weak as these cases having occurred in June/July. This seasonality in consecutive years (2006, 2007 and 2008) strongly suggests a biological or ecological basis for 'spillover' from flying foxes to horses. All properties with cases reported flying fox activity in the vicinity.
- Index cases (the first confirmed cases) have typically been horses paddocked in areas that were attractive to flying foxes. Companion horses were present in the majority of cases, and only on two occasions have these in-contact horses been infected (Mackay 1994 and Proserpine 2008). Spread between horses appears limited in a paddock situation.
- HeV horse-to-horse transmission has been more efficient in a stabled situation, with spread between horses occurring in both stabled situations to date—Hendra (1994) and Redlands (2008). It is possible that HeV may survive on fomites for a period of hours under mild climatic conditions, and that transfer to other horses from contaminated fomites may occur.
- Experimentally infected horses (with the original virus isolate from Hendra) did not transmit infection to in-contact horses. Experimentally infected cats and guinea pigs were susceptible to HeV infection. In an experimental setting, a horse was infected following contact with the urine of an infected cat. It is not known whether cats can transmit infection to other animals or to humans. Experimentally infected dogs, rabbits, chickens, rats and mice did not develop clinical disease, but some developed antibodies to HeV.
- Evidence of infection has not been found in any non-equine domestic species in contact with naturally infected horses; however, this potential exists and should be considered.
- From information available, the incubation period in horses (time from exposure to first signs appearing) falls between 5 and 16 days. The course of illness for fatally infected horses averages a little over 2 days from first signs to death. The case fatality rate in horses is approximately 75%.
- From information about the confirmed cases to date, approximately 25% of horses can survive acute infection and become 'recovered' horses. The current national policy is for these horses to be euthanased (AUSVETPLAN Hendra Virus Policy Brief)
- Six cases of human infection have been recorded. All cases had exposure either during autopsy of infected horses or from close contact with infected horses. In all cases, HeV was not a diagnosis considered at the time and exposure had occurred before the equine case was confirmed with HeV. Three of these people died as a result of HeV infection – a case fatality rate of 50%.

4.3 Legislative basis or considerations

HeV is a notifiable disease under both the [Stock Act 1915](#) and the [Exotic Diseases in Animal Act 1981](#). This places an obligation on a person who suspects, diagnoses or confirms the presence of a notifiable disease (which includes HeV) to notify the nearest government biosecurity inspector or veterinarian as soon as possible.

Obligations are also present in the [Veterinary Surgeons Act 1936](#) to notify based on suspicion, diagnosis or confirmation as in the previous paragraph.

See also section 5.3 [Notifications required](#).

Whenever Biosecurity Queensland is satisfied or is of the opinion that stronger action is necessary to manage and control the situation, it may place the premises in quarantine and implement a disease control program.

4.4 Training requirements

It is recommended that veterinarians develop, train in and apply infection control procedures to manage the risks associated with suspect, or highly suspect HeV cases. Infection control procedures appear to be the primary defence against horses in the pre-clinical phase where they may excrete HeV virus but still appear clinically normal.

It is recommended that veterinary clinics treating horses document a response plan for HeV. This would include how each practice will respond to suspect or confirmed cases of HeV. Regular training of all staff in the implementation of this plan is recommended.

The use of the recommended personal protective equipment (PPE) will require training if this PPE is not routinely used by veterinarians. This is discussed further in section 5.5.

The packaging of samples for laboratory diagnosis may also require training (available from private providers) to ensure compliance with transport requirements for diagnostic samples.

4.5 Confidentiality

Normal confidentiality provisions apply. Note that HeV can generate considerable media interest and that any statement made should respect the normal confidentiality provisions expected by clients, patients, staff and others involved.

4.6 Document tracking

This document will be managed by Biosecurity Queensland under their document [GM-S-001 Quality Management System](#).

4.7 Additional assistance

If you require assistance in any area related to HeV, please contact Biosecurity Queensland either through your nearest Biosecurity Queensland office or the Business Information Centre on 13 25 23.

4.8 Related reference documents

Standard operating procedure Legislation	GM-S-001 Quality Management System Exotic Diseases in Animal Act 1981 www.legislation.qld.gov.au/LEGISLTN/CURRENT/ E/ExoticDisAnA81.pdf Stock Act 1915 www.legislation.qld.gov.au/LEGISLTN/CURRENT/ S/StockA15.pdf Veterinary Surgeons Act 1936 www.legislation.qld.gov.au/LEGISLTN/CURRENT/ V/VetSurgA36.pdf Workplace Health and Safety Act 1995 www.legislation.qld.gov.au/LEGISLTN/CURRENT/ W/WorkplHSaA95.pdf Workplace Health and Safety Regulation 1997 www.legislation.qld.gov.au/LEGISLTN/CURRENT/ W/WorkplHSaR97.pdf
AUSVETPLAN	Decontamination Manual www.animalhealthaustralia.com.au/fms/Animal%20Health%20Australia/AUSVETPLAN/decfnl2.pdf Hendra Virus Policy Brief— Response policy brief www.animalhealthaustralia.com.au/fms/Animal%20Health%20Australia/AUSVETPLAN/rpb15final.pdf
Guide	Information for Horse Owners—Primary Industries and Fisheries web page Hendra virus guidelines for vets www.dpi.qld.gov.au/cps/rde/dpi/hs.xsl/4790_11113 _ENA_HTML.htm
Medical Journal of Australia	Hendra virus infection in a veterinarian www.mja.com.au/public/issues/185_10_201106/ha n10698_fm.pdf
Australian Animal Health Laboratory	Initial experimental characterisation of HeV (Redland Bay 2008) infection in horses - D Middleton, CSIRO Australian Animal Health Laboratory (AAHL) http://www.dpi.qld.gov.au/documents/Biosecurity_ GeneralAnimalHealthPestsAndDiseases/HeV- Initial-experimental-characterisation.pdf

5. Actions

5.1 Case definition

Note: The case definition in these guidelines relates only to clinically demonstrable signs as the first likely field indicator of a case of HeV. The report of the AAHL experiment (2009) indicates that infected horses may be excreting HeV in nasal or naso-pharyngeal secretions for at least 2 days prior to onset of clinical signs but that during this early phase, they do not demonstrate any clinical signs.

A horse that meets the case definition for HeV has potential to already have systemic spread of HeV into body fluids and tissues. As such, it is at its most dangerous with respect to potential transmission of HeV. A laboratory test is required to confirm (or not) whether a horse meeting the case definition is actually infected with HeV.

HeV can cause a broad range of clinical signs in horses and in particular is recognised as causing neurological and respiratory signs. As outlined in 4.2, HeV has an affinity for endothelial cells and causes systemic vasculitis. The organ/system where the greatest damage occurs would appear to contribute directly to the clinical signs seen.

For most of the individually infected horses observed, there has been the presence of some clinical signs common to most of the cases which, when combined with a range of other signs seen, give the horse a predominantly neurological or respiratory presentation.

In most of the recorded infected cases, there has been strong presentation of clinical signs; however, occasional cases have demonstrated a much milder presentation of clinical signs.

HeV should be considered where there is acute onset, increased body temperature, increased heart rate, and rapid progression to death associated with either respiratory or neurological signs.

Note: From the AAHL experiment (2009) an elevated temperature and heart rate should be considered as early warning of the possibility of HeV infection. Progression to include other symptoms, as mentioned below, increases the possibility of HeV infection.

The precautionary principle should be applied if progression to more overt clinical signs, a moribund state or death occurs. It has been suggested (AAHL 2009) that a strongly symptomatic horse poses the greatest transmission risk through a variety of excretions. Appropriate infection control and general biosecurity measures must be applied to the sampling and management of such horses.

From information about the confirmed cases to date, approximately 25% of horses can survive acute infection.

Common clinical signs

- acute onset of illness
- increased body temperature
- increased heart rate
- discomfort/ weight shifting between legs
- depression
- rapid deterioration.

Some other clinical observations that have been noted

Respiratory signs, that include:

- pulmonary oedema and congestion
- respiratory distress—increased respiratory rates
- terminal nasal discharge—can be initially clear progressing to stable white froth and/or stable blood stained froth
- terminal weakness, ataxia and collapse.

Neurological signs, that include:

- 'wobbly gait' progressing to ataxia
- altered consciousness—apparent loss of vision in one or both eyes, aimless walking in a dazed state
- head tilting, circling
- muscle twitching—myoclonic spasms have been seen in acutely ill and recovered horses
- urinary incontinence
- recumbency with inability to rise.

Other observations include:

- previous unexplained horse deaths
- facial oedema
- facial paralysis and/or a locked jaw
- spasms of the jaw, involuntary chomping
- muscle trembling
- altered gait, high stepping
- anorexia
- congestion of oral mucous membranes
- a high case fatality rate within 48 hours where there are multiple cases
- colic-like symptoms in some cases (generally quiet abdominal sounds on auscultation of the abdomen in pre-terminal cases)
- straining with difficulty passing manure
- stranguria (difficult urination) was seen in several terminal cases in both males and females (Hendra 1994); dribbling urine was seen in some terminal cases (Redlands 2008)
- hot hooves
- bad breath
- proximity to flying foxes would support the above signs, though lack of sightings does not preclude HeV.

In a paddock situation, HeV disease in horses is much more likely to occur as a single sick or dead horse than as a number of affected horses. In paddock situations to date, the majority have involved one infected horse that went on to die without any companion horses becoming infected. However, on two occasions, one or more companion horses have become infected after close contact with the index case prior to or at the time of death.

In a stable situation, it appears that HeV has the potential to spread to other horses either through close direct contact with infectious body fluids, or through indirect contact via contaminated fomites, including human assisted transfer. Two events in stables (Hendra and Redlands) have resulted in multiple horses becoming infected. It should be noted that both these events appear to have arisen from a horse infected in a paddock or outside yard being brought into a stable situation.

5.1.1 Suspect case

If a veterinarian assesses that:

- a horse is showing a partial fit to this case definition
- HeV is one of a number of differential diagnoses being considered
- sampling to test for HeV exclusion is necessary

*the horse should be considered as a **suspect case**.*

These guidelines apply mainly to the **investigation** of such **suspect** cases and are provided to assist the investigation of suspect cases by private veterinary practitioners during performance of their normal work.

5.1.2 Highly suspect case

If a veterinarian assesses that:

- a horse matches the case definition very closely
- HeV is a primary diagnosis
- sampling is essential to confirm the presence or absence of HeV
- the horse should be considered as a highly suspect case.

A private veterinary practitioner should not proceed with an investigation of a highly suspect case without first notifying and consulting Biosecurity Queensland and being fully familiar with appropriate biosecurity and sampling practices.

5.1.3 Other animals

Clinical signs that should prompt a veterinarian to consider HeV disease in other companion animals include:

- possible contact with HeV infected horses
- acute febrile illness
- rapidly progressive respiratory or neurological illness.

Any person, who becomes ill within 14 days of contact with sick horse/horses when HeV is confirmed or highly suspected, should seek medical advice and contact their local Queensland Health Population Health Unit. When HeV has been confirmed in horse/horses, medical advice should be sought by all people who have had potential contact.

5.2 Differential diagnoses

Other causes of acute death include:

- plant poisonings such as Crofton weed poisoning or avocado poisoning—some apparent HeV cases have, in fact, been avocado poisoning and vice versa
- chemical poisonings—paraquat, lead, fluoroacetate, ionophores (e.g. monensin)
- colic
- intoxications (botulism)
- acute bacterial diseases, such as anthrax.
- Other causes of respiratory or neurological disease:
- inhalation pneumonia or purulent bronchopneumonia
- equine herpes virus (neurological strain)
- Murray Valley encephalitis
- Exotic viruses such as African horse sickness, equine influenza, Japanese encephalitis, West Nile virus, encephalitides (Eastern, Western, Venezuelan), Hanta virus pulmonary syndrome.
- acute septicaemias
- purpura haemorrhagica
- snake bite envenomation.

5.3 Notifications required

When a veterinarian diagnoses suspect cases or includes HeV as a differential diagnosis, a government veterinarian must be notified as soon as possible (there is a legal obligation to do this as outlined in section 4.3 [Legislative basis or considerations](#)). If it appears that human illness may be associated with the case, the veterinarian should also include this information when contacting the government veterinarian. Notification is also an opportunity to seek advice.

Notification can be done contacting one of the following:

- Primary Industries and Fisheries Business Information Centre on 13 25 23 (business hours)
- Emergency Animal Disease Watch Hotline 1800 675 888 (at any time)
- the nearest Biosecurity Queensland veterinary officer.

When a veterinarian makes contact they should identify themselves and clearly state to the person answering the telephone that they are a veterinarian ringing in to notify a suspect case of HeV.

When notified of a suspect case by a veterinarian, Biosecurity Queensland will consult with the veterinarian to determine an appropriate course of action. For suspect cases this would usually be for the private veterinary practitioner to complete the investigation and submit samples for testing.

When notified of a highly suspect case by a veterinarian, Biosecurity Queensland will assess the case with the person reporting the case. From this assessment a joint decision will be made on a course of action appropriate to the situation. This may be for the private veterinary practitioner to complete the investigation and submit samples for testing or it may be that Biosecurity Queensland will investigate.

Biosecurity Queensland will notify the Australian Veterinary Association and Equine Veterinarians Australia and other bodies as appropriate. Notification to industry bodies is normally made only after a positive diagnosis, not in the instance of suspect cases, unless there are exceptional circumstances.

5.4 Quarantine and other restrictions

Whenever Biosecurity Queensland is of the opinion that stronger action is necessary to manage and control a suspect or confirmed HeV situation, it may place the premises in quarantine and implement a disease control program.

If Biosecurity Queensland makes a decision to quarantine the property, Biosecurity Queensland will assume responsibility for the animal disease control program. Biosecurity Queensland may retain the services of the private veterinary practitioner as part of this response.

If a property is not quarantined, the veterinarian will continue to manage the animal disease investigation. The aim of an investigation where HeV is a differential diagnosis is to maintain safety of all people and animals involved, clinically assess the situation, obtain samples to help make a definitive diagnosis, give advice to the owner and report findings.

Biosecurity Queensland will contact Queensland Health whenever HeV is confirmed or highly suspected. Queensland Health will decide whether any people require monitoring and/or medical assistance. To make this assessment, Queensland Health will work with the veterinarian and the owner to identify the people they would like to contact.

If any person is concerned about their health, they should seek medical advice.

5.5 Safety precautions

5.5.1 Workplace health and safety precautions

This is a complex area and anyone needing advice should contact Workplace Health and Safety Queensland on **1300 369 915** or online at the WHSQ website www.deir.qld.gov.au/workplace/index.htm

Where a horse is sick, check whether it meets the case definition for HeV as outlined in section 5.1.

If you consider a suspect case or a highly suspect case for HeV, and the horse is on your premises, you have workplace health and safety obligations.

At your premises you should:

- isolate the sick or dead horse from all people, all other horses and all other pets on the premises
- make the necessary notifications—see section 5.3
- develop a plan to safely manage the situation on your premises, or implement an already agreed site biosecurity plan
- limit human contact with all horses on the site that have had contact with the sick or dead horses until it is resolved that the problem is not HeV or that HeV is no longer present
- assess risks (for example, in areas where body fluids are present such as on walls and in stable litter that could expose people or horses) and take steps to isolate these risks
- provide advice on the correct PPE to be worn and instruction to those people specified to have contact with the horse
- send required samples to a government veterinary laboratory for HeV exclusion testing
- get a advice from Biosecurity Queensland about disposal of any dead horses pending sample results
- notify the Department of Employment and Industrial Relations, Workplace Health and Safety Queensland of any incident resulting in a person contracting HeV
- advise any person who is concerned about their health at any time to seek medical advice.

If a suspect or highly suspect case for HeV is identified when visiting other premises in a professional capacity, WH&S obligations exist in conjunction with the owner/manager while present on the premises as the premises becomes a workplace. WH&S obligations remain only while working on the premises.

When visiting other premises:

- advise the owner/manager to isolate the sick or dead horse from all people, all other horses and all other pets on the premises
- ensure the necessary notifications are made—see section 5.3
- advise the owner/manager of the development of a plan to handle the situation on the premises
- advise owner/manager to limit human contact with all other horses on the property that have had contact with the sick or dead horses until it is resolved that the problem is not HeV or that HeV is no longer present on the property
- advise owner/manager of risks (for example, areas where body fluids are present such as on walls and in stable litter that could expose people or horses) and take steps to isolate these risks
- advise owner/manager of suitable PPE to be used by those people required to have contact with the horse
- collect and send required samples to a government veterinary laboratory for HeV exclusion testing
- advise owner/manager to get advice from Biosecurity Queensland about disposal of any dead horses pending sample results
- notify Employment and Industrial Relations, Workplace Health and Safety Queensland of any incident resulting in a person acquiring HeV
- advise any person who is concerned about their health at any time to seek medical advice.

Further advice

If Biosecurity Queensland places a property under quarantine for HeV, that property becomes a workplace of Biosecurity Queensland. Biosecurity Queensland will work closely with the owner/manager to undertake the WH&S responsibilities while the property remains under quarantine and will determine what activities take place on that property. For all other non-quarantined properties, WH&S responsibilities remain with the owner/manager/carer and with the private veterinary practitioner and Biosecurity Queensland if they enter the property in a business capacity.

If after notification, discussion and mutual agreement, a private veterinary practitioner hands over a case on a non-quarantined property to Biosecurity Queensland, then Biosecurity Queensland will meet its own WH&S obligations while undertaking the investigation.

These Guidelines are intended to provide advice to allow private veterinary practitioners to investigate cases of suspect or highly suspect HeV horses safely and supplement existing WH&S obligations.

Supporting information

Veterinarians already have obligations under WH&S legislation.

- If the property a veterinarian owns or manages is already a workplace in its own right (that is, a business is run from that site) obligations under WH&S legislation already exist for that workplace. The workplace health and safety (WH&S) responsibilities required to handle sick and dead horses form part of existing WH&S responsibilities. When another person operating a business (for example, another veterinarian, a farrier, horse dental practitioner etc) visits your workplace, they have WH&S obligations while on the premises and should consult and cooperate with you while on site to contribute to a safe working environment.
- If you are a person conducting a business or undertaking (for example, a veterinarian, a farrier, horse dental practitioner etc), and you visit a property to work on a horse, that area becomes a workplace and obligations under WH&S legislation exist for the workplace. Under these obligations you are required to consult and cooperate with the site owner in the discharge of your WH&S obligations to provide a safe workplace.
- When a visiting person in business leaves a premises, they no longer have ongoing WH&S obligations for the premises. However, the owner of the business premises continues to have WH&S obligations and should take into account professional advice given (e.g. from a veterinarian while they were on the property) in the development of their response.
- If a premises is not a workplace (that is, a business is not run from that site) then a common law duty of care still exists to provide safe conditions.

For those with obligations under WH&S legislation as outlined above, a short summary of the obligations follows:

Veterinarians and practice principals who conduct a business or undertaking, whether as employers, self-employed persons or otherwise, have an obligation under section 28 of the Workplace Health and Safety Act 1995 to ensure the workplace health and safety of themselves, their workers and others including veterinary students, animal owners and persons in charge of animals on their own property that are attended by the veterinarian.

This includes:

- providing and maintaining a safe and healthy work environment
- maintaining safe plant
- ensuring the safe use, handling, storage and transport of substances
- ensuring safe systems of work
- providing information, instruction, training and supervision to ensure health and safety.

Notify the Workplace Health and Safety Queensland division within Employment and Industrial Relations if a person contracts an HeV infection and work, a workplace or a workplace activity was a significant contributing factor to the illness. Notification can be made by contacting WHSQ on **1300 369 915** or online at the WHSQ website www.deir.qld.gov.au/workplace/index.htm.

Where a person is unsure of any procedures, they should consult with Workplace Health and Safety Queensland on **1300 369 915** or Biosecurity Queensland.

Veterinarians and practice principals should also:

- exclude or isolate any persons not required in the undertaking of their business
- advise any owner or other contact person showing signs of ill health at or soon after a disease investigation where HeV is confirmed or highly suspected to seek medical advice AND to contact their local Queensland Health Population Health Unit
- inform Industrial Relations, Workplace Health and Safety Queensland of any incident resulting in a person acquiring HeV
- minimise the risk of contact with potentially infectious material by all staff members. This would include veterinarians who may be called to potential HeV infected animals and staff who may handle contaminated PPE, instruments, clinical waste or animal waste
- ensure that any potentially infected animal does not pose a risk of infection to other animals or to people. Where disposal occurs on property, this could include ensuring that a disposal option is used that is safe and does not cause environmental harm or contamination. Disposal should be undertaken by persons who are aware of the risks and familiar with appropriate disposal methods.

5.5.2 Personal safety and prevention of zoonotic risk

Human infection with HeV has a high case fatality rate. Human infections have occurred from handling HeV infected horses (both live horses and dead horses at necropsy examination), so great care is needed to ensure personal safety, and that of workers and others that may be assisting.

A major problem has been that HeV is often diagnosed retrospectively (i.e. after human exposure has occurred). This reinforces that these guidelines should be implemented on suspicion of HeV, rather than waiting for confirmation.

It also reinforces the importance of developing appropriate infection control procedures to use in day to day situations. Appropriate infection control procedures appear to be the primary defence for horses in the pre-clinical phase where they may excrete HeV virus but still appear clinically normal.

A recommended approach is to:

- develop an individual and a practice biosecurity plan that outlines how HeV risks will be managed by the practice and individual veterinarians in that practice
- this plan should routine infection control procedures and response procedures for suspect or highly suspect cases
- take precautions based on suspicion of HeV; do not wait for confirmation
- isolate sick or dead horse/s from people and all other animals, including pets
- limit contact with all other horses to essential people equipped with adequate PPE
- promote personal hygiene—especially hand washing and showering—for in-contact people. Employers must ensure that hand washing facilities are readily available for workers' use
- Adopt additional precautions for infection control (airborne transmission) in addition to standard precautions. Ensure adequate PPE is used (see 5.5.3). Protect all exposed skin, mucous membranes and eyes from direct contact and prevent inhalation of airborne particulates. Promote regular hand washing and washing of exposed skin with soap

- cuts and abrasions should be covered by water-resistant occlusive dressings that should be changed as necessary
- identify hazards and take steps to minimise the risks associated with them (e.g. if decontaminating an area, avoid aerosols and generating splashes from equipment such as high-pressure hoses)
- inform anyone who may be potentially exposed—such as owners, handlers and others (including other veterinarians and veterinary assistants)—of the risk and of the appropriate procedures to be followed
- refer to Biosecurity Queensland, Queensland Health and Workplace Health and Safety Queensland for advice as required. If confirmed, Biosecurity Queensland will quarantine the property and implement a response on that property.

In particular, treat blood and other body fluids (especially respiratory and nasal secretions, saliva, and urine) and tissues as potentially infectious and take appropriate precautions to prevent any direct contact with, splashback of, or accidental inoculation with these body fluids.

The Medical Journal of Australia of 20 November 2006 contains an article titled [Hendra virus infection in a veterinarian](#)ⁱ detailing a case where a veterinarian became infected with HeV after performing a necropsy on a HeV infected horse without taking adequate precautions.

5.5.3 Personal protective equipment (PPE)

It is recommended that veterinarians discuss their safety needs with a registered supplier of safety equipment. Veterinarians will receive expert advice and be provided with a selection of products appropriate for individual situations from the vast array of safety equipment products available.

PPE forms a part of the risk management approach to personal safety. Other factors outlined in 5.5.2 [Personal Safety and Prevention of zoonotic risk](#), such as HeV planning and preparedness and managing exposure to HeV risks, also play their part. PPE should be combined with these to provide the best protection possible.

The PPE suitable for use with HeV may not be used routinely in normal veterinary practice. It should be sourced ahead of time and training received in its correct use. Training is available from some suppliers of PPE and there are also some commercial providers that can be sourced through due enquiry.

Note: Primary Industries and Fisheries do not have specialist PPE trainers and sources its PPE and training from providers to meet the various demands of emergency animal disease response. The PPE selected is intended to form a barrier between the person and the HeV virus and should include gloves, particulate respirator, eye protection (e.g. face shield, overalls and impervious boots).

The following PPE is used by Biosecurity Queensland officers when investigating suspect HeV situations to collect samples to exclude HeV:

- impervious rubber boots
- impervious overalls (long sleeves to prevent contamination of skin where there may be cuts and abrasions) OR cotton or disposable overalls with impervious apron or impervious covering/coating

ⁱ Hanna, J.N., McBride, W.J., Brookes, D.L., Shield, J., Taylor, C.T., Smith, I.L., Craig, S.B. and Smith, G.A. (2006). Hendra virus infection in a veterinarian. *Medical Journal of Australia*, 185 (10): 562–564.

- disposable impermeable gloves (nitrile gloves recommended) double gloved
- face shield or safety eyewear (to protect against facial splashing)
- a particulate respirator. **The minimum level of respiratory protection when investigating a suspect case is P2** (also known as N95) particulate respiratory protection. See 5.5.4 for further comment. Follow label advice and directions.

Where Biosecurity Queensland officers assess that a higher level of risk exists or a horse is highly suspicious or known positive, the standard of PPE required is increased accordingly.

Biosecurity Queensland does not recommend that private veterinary practitioners proceed with an investigation where a case is considered highly suspect (i.e. it matches the case definition very closely) or is known positive without first consulting with Biosecurity Queensland, unless the veterinarian is fully familiar with appropriate biosecurity and sampling practices.

5.5.4 Respiratory protection

After due investigation, Biosecurity Queensland has a Work Instruction standard for its officers that the minimum level of respiratory protection for investigating suspect HeV situations will be at P2 or N95 particulate protection level. This is supplied either by a disposable half face P2 particulate respirator, or use of P2 filters on either a half face mask, a full face mask, or on a powered air purifying respirator (PAPR).

Note: there are many different masks providing respiratory protection for many different situations—Biosecurity Queensland has chosen masks rated as P2 particulate or N95 particulate that are suitable for the situations faced by Biosecurity Queensland officers. For more information, contact a registered supplier of safety products.

Biosecurity Queensland officers are supported if they assess that a higher level of protection is needed (e.g. P3 or N99 particulate level protection), and suitable equipment to provide this level of protection is supplied.

Where Biosecurity Queensland officers may be exposed to known HeV contaminated body fluids and tissues (e.g. necropsy of positive animals), then P3 particulate level protection is stipulated as the minimum. If P3 particulate level respiratory protection is required, there is also a corresponding increase in the level of other PPE used to cater for the assessed risk level, (e.g. use of waterproof overalls put on over disposable overalls, specialised non-cut gloves etc).

Note: A standard surgical facemask is not a respirator and will not provide respiratory protection. (Refer to Australian Standard AS 1715 for information on implementing a respiratory protection program).

P2 particulate respirators should be available through your normal veterinary supplier or from a safety equipment supplier. Training is available from some suppliers of PPE and there are also some commercial providers that can be sourced through due enquiry.

The following comments in this section are drawn from a range of existing safety recommendations and previous experience.

If you are uncertain whether your PPE will provide adequate protection in a particular situation you should seek expert opinion before entry.

Disposable half face piece respirators with exhalation valves may be more comfortable to wear if they are required to be worn for prolonged periods.

Disposable P2 or N95 particulate respirators are only suitable for clean-shaven/non-bearded people as a facial seal is critical in ensuring respiratory protection. They depend on an effective seal with the skin of the face and will not provide P2 level protection if the wearer has facial hair including a beard, moustache, side burns or stubble growth. Hence, these people should not take part in any investigations unless different respiratory protection is used (e.g. a powered air purifying respirator (PAPR) that draws air in through a filter and supplies it to a hood worn over the head). Both P2 and P3 level particulate filters can be used with a PAPR and it can also be used to provide a higher level of protection for aerosol-generating procedures such as may occur during necropsy.

A half face respirator cannot supply P3 level particulate protection even if P3 or N99 particulate filters are fitted. P3 level particulate protection can only be achieved using a whole face respirator or a PAPR.

Commercial suppliers of PPE equipment and training can equip people with the gear that is correct for them and then train people in its correct use. This includes:

- respirator fit testing. This is a method to determine the brand and size of respirator that is best suited to an individual's facial characteristics, and can be performed using qualitative or quantitative test methods. Veterinarians who regularly care for horses should conduct respirator fit testing to ensure that they and their workers know which respirator will best protect them if a HeV investigation occurs
- correct donning procedure and fit checking. Once selected, this allows the respirator to be donned correctly and fit checked to ensure it has sealed on the face correctly. A fit check should be performed each time a respirator is donned. Do not handle or touch the respirator once it has been correctly positioned on the face, as this may modify the facial seal.

5.5.5 Training requirements

The use of the recommended personal protective equipment will require training if this PPE is not routinely used in a veterinary practice, for example P2 (equivalent to N95) disposable respirators. As discussed, this training is available from the companies that supply this PPE, or from other registered safety companies.

Correct sample packing procedures may also require training to be completed to become accredited. This training is available from some courier companies and other professional providers.

5.5.6 Notification requirements for work-caused HeV infection

An employer is required to notify the Workplace Health and Safety Queensland division within Employment and Industrial Relations if a person contracts a work-caused illness such as HeV, and work, a workplace or a workplace activity was a significant contributing factor. Notification can be made by contacting WHSQ on **1300 369 915** or online at the WHSQ website www.deir.qld.gov.au/workplace/index.htm

For more information on workplace health and safety obligations contact Workplace Health and Safety Queensland on **1300 369 915** or online at the WHSQ website www.deir.qld.gov.au/workplace/index.htm

5.6 Property investigation

The following steps can be used to assist investigation of suspect HeV cases.

Attending veterinarians should also make an assessment of companion animals to the affected horse, including other horses, pets and any other animals. If these are also showing illness, they should be isolated and reported when notifying the case as per section [5.3](#).

Safety of persons is the primary consideration.

5.6.1 Guide to sequence of events

- Before entering the property, review the case definition (section 5.1). If it meets the case definition for a suspect case, read the guidelines before attending the case. If the case definition confirms a highly suspect case, consult Biosecurity Queensland before proceeding.
- Read section 5.5, Workplace health and safety precautions.
- Ensure you have suitable PPE (section 5.5.3), disinfectant (5.6.2), sampling equipment (5.6.4).
- Park outside the property or outside the dirty area if it is not the property boundary.
- Select an entry/exit point (5.6.2).
- Enter property/dirty area (5.6.2).
- Undertake examination, live animal sampling, post-mortem sampling or limited necropsy (5.6.4) as appropriate.
- Remove any gross contamination from self and equipment while in the dirty area.
- Exit property (5.6.2 or 5.6.3).
- Give appropriate biosecurity advice to the owner (5.7).
- Notify the relevant authorities (section 5.3).
- Dispatch samples (5.6.4).
- Downtime (5.6.6).

5.6.2 Disinfectants

Investigation undertaken by Biosecurity Queensland has not identified any specific testing of disinfectant compounds against HeV—this reflects the uncommon nature of this disease.

However, HeV has the characteristics that place it into a category of viruses that contain a lipid envelope. See AUSVETPLAN [Decontamination](#) Manual for more information.

In AUSVETPLAN, HeV is a member of Category A viruses.

Disinfectants named here have been drawn from the list that either are known to have effect against all viruses or specific action against Category A viruses.

Disinfectants include:

- soaps and detergents
- Virkon
- hypochlorites
- iodophors/iodine
- biguanidines (e.g. chlorhexidine)
- quaternary ammonium compounds.

Others are named in Ausvetplan but these require special precautions to use and are not listed here.

The use of any disinfectants that are hazardous substances must be in accordance with the hazardous substances provisions of the Workplace Health and Safety Regulation 2008.

5.6.3 Entry/exit procedure

Detailed entry/exit procedural guidelines have been developed by Biosecurity Queensland for use by Biosecurity Queensland officers for a range of emergency animal diseases.

The rest of this section has been drawn from these Biosecurity Queensland procedures and applied to the situation where a case is being investigated and sampled by swabbing, blood collection and/or limited necropsy to exclude HeV.

Biosecurity Queensland does not recommend that a private veterinary practitioner undertake an extensive necropsy on a suspect, highly suspect or positive horse unless the private veterinary practitioner has contacted Biosecurity Queensland and is working under their instruction. For such cases, Biosecurity Queensland has more detailed procedures that require prior instruction to undertake.

Veterinarians are free to use the Biosecurity Queensland procedures to assist them in making their own biosecurity plans to suit their type of practice and the situations they attend.

For more information on Biosecurity Queensland entry/exit procedures contact 13 25 23 during business hours. State that you are a veterinarian wishing to get more information about the HeV guidelines and you will be put through to a Biosecurity Queensland officer.

Note:

- If Biosecurity Queensland quarantine a site and take control of the disease response on that site, then Biosecurity Queensland can direct that all people (and all their effects) entering or leaving should conform to the Biosecurity Queensland procedures for that site.
- For non-quarantined sites, Biosecurity Queensland cannot direct what entry/exit procedures are used, which means that professionals visiting such sites need to develop their own systems and procedures.

Entry/exit refers to the procedure to follow to enter and leave a contaminated area safely (i.e. to maintain personal safety and prevent disease spread off the premises). The entry/exit site is selected at the boundary of the known/suspect contaminated and clean areas. This may be at the property boundary or on the property much closer to the sick horse if the horse has been kept isolated. Veterinarians should make an assessment of the entry/exit point on a case-by-case basis.

Where HeV is not initially suspected until during an examination, the predominant actions will then be safe withdrawal from the site and the best exit strategy for the situation. See section 5.6.4.

5.6.3 Entry/exit procedure

At the selected entry/exit point identify a 'clean area', a 'dirty area' (i.e. the area where the suspect case is situated) and a small transition area in between where you take actions to move back and forth between the clean and dirty areas. On the clean side, lay out all gear required for the investigation, and, before donning (putting on) PPE, double check that nothing has been missed and that no unnecessary gear is being taken on.

Then:

- Make sure containers of disinfectant along with soap, clean water and disposable paper towels are available and placed at the entry/exit point for use during exit. Disinfectants effective against HeV are listed in section 5.6.2. Disinfectants are easily applied from a spray bottle with a hand action trigger, and several of these should be available and filled with disinfectant before commencing operations. Bottles of 250 ml or 500 ml are convenient sizes. Have at least one available in the designated 'dirty' area and at least one available at the boundary of the 'dirty' area to facilitate disinfection of samples, equipment and personnel out of the area.

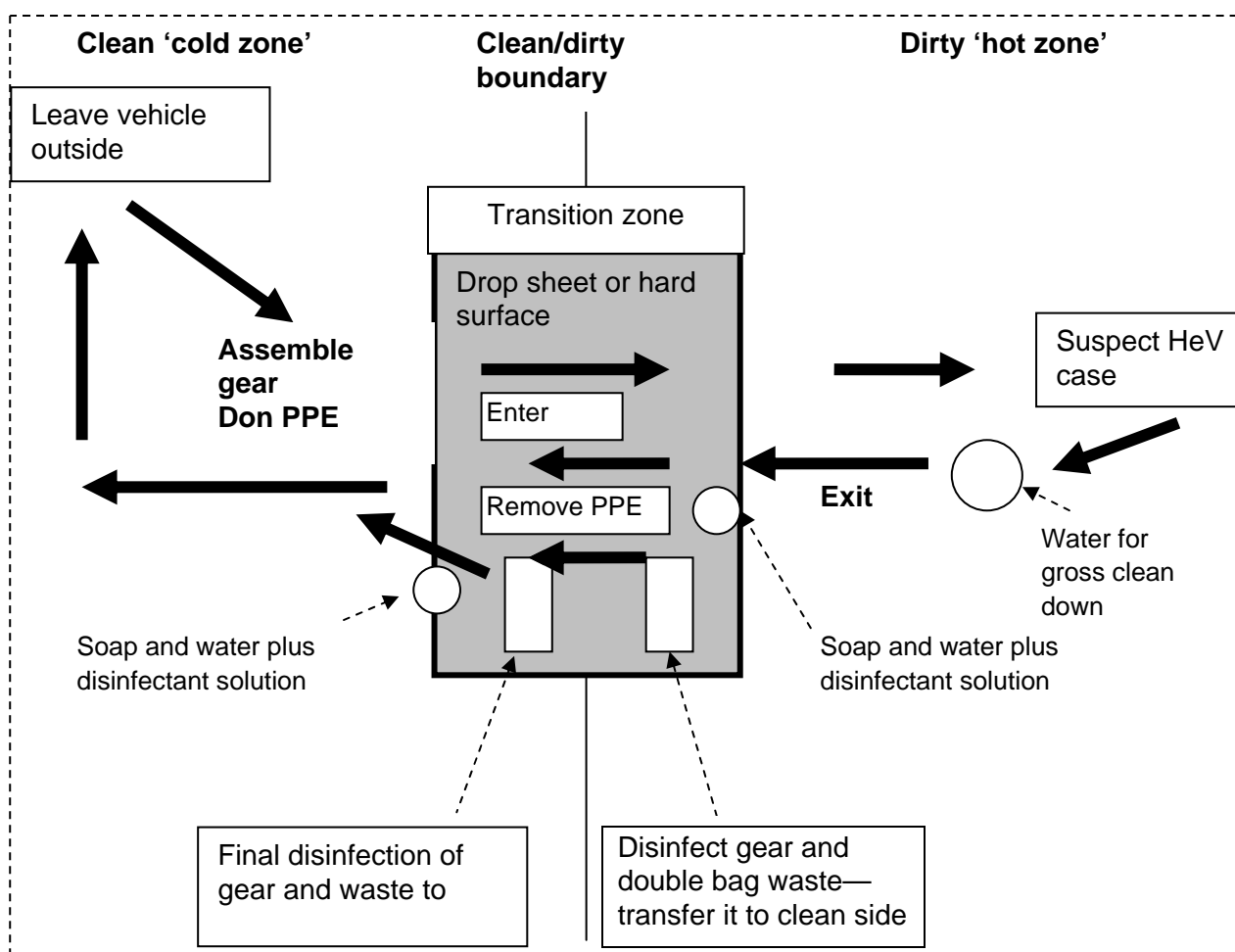
- PPE should be donned in the following sequence to assist best personal safety.
 - Wash hands, then don overalls (preferably disposable overalls), boots (overall legs go outside boots), safety eyewear, gloves and disposable respirator, pull overalls hood up if present and zip to chin. Perform respirator fit check. Double glove and tape the outer gloves onto the sleeves of the overalls with duct tape.
 - If using a PAPR—wash hands, then don overalls, boots (overall legs go outside boots), pull overalls hood up if present and zip to chin, PAPR and gloves. Double glove and tape the outer gloves onto the sleeves of the overalls with duct tape.
- Pick up the selected gear and move into the dirty area to conduct the investigation. Any person assisting or in close proximity must wear the same PPE.
- Ensure safe sharps handling and disposal to prevent accidental percutaneous exposure. It is advisable to take in a sharps container that can hold the full length of a syringe with the needle still on.
- Undertake planned actions. Examine the horse, take samples, conduct limited necropsy etc.
- Decontaminate the primary sample containers, and place in a secondary container such as a plastic bag or larger plastic container. Ideally 'double bag' the containers to contain contamination—note the disinfectant may neutralise HeV in the sample if there is any leakage into containers, so do not have the primary container 'swimming' in disinfectant where placed in the secondary container.
- If decontaminating the site, avoid generating splashes and aerosols (e.g. do not use a high-pressure hose)
- Remove gross contamination from self and equipment. Do this before reaching the entry/exit point to minimise the risk of spreading contamination beyond the designated dirty area. Use a brush and soap or detergent and water. Clean the treads on boots.
- Return to entry/exit point—the process of leaving the dirty area is aimed at minimising the amount of potential HeV that is taken past this point.
- Place waste (material that cannot be decontaminated—e.g. gloves, absorbent materials etc) in a plastic bag and seal, decontaminate the outside by dipping in or spraying with disinfectant. Then seal this primary bag in a second bag, decontaminate outside and place in the clean area (i.e. a double bagging process).
- Decontaminate boots preferably by scrubbing in a footbath or bucket of disinfectant.
- Spray disinfectant on the outer gloves.
- Decontaminate samples, equipment and other gear to the clean side.
- The final step is to remove PPE.
- Move towards the clean side of the transition zone (or plastic sheet if one is laid down)
 - To remove PPE where the respirator is a P2 half face respirator or a negative pressure full face respirator: remove the outer pair of gloves; wash hands, still encased in the inner pair of gloves, in disinfectant; remove overalls and boots. Remove and disinfect safety eyewear and respirator. Keep respirator on until any dust has settled from removal of overalls. Remove inner pair of gloves.
 - To remove PPE where the respirator is a powered air purifying respirator (PAPR): Remove the outer pair of gloves; wash hands, still encased in the inner pair of gloves, in disinfectant; remove and disinfect the PAPR. Remove overalls and boots and finally the inner pair of gloves;
- Decontaminate PPE or double bag it if it cannot be adequately decontaminated (e.g. disposable overalls, gloves).
- Always wash hands after removing PPE.
- Depart taking care not to re-enter the dirty area.
- Shower with soap and shampoo (see also Downtime section 5.6.7).

If accidental exposure to blood or body fluid or sharps injury occurs, wash the affected area of skin thoroughly with soap and water and/or irrigate mucous membranes with water or saline. Seek prompt medical advice.

Double bagged items can remain double bagged until results are known. If positive, Biosecurity Queensland will assist with disposal. If negative, dispose or decontaminate as per normal practice procedures.

Supporting diagram

Select and set up an **entry–exit decontamination site** before entering the property. The site should be on a boundary between clean and dirty areas.



5.6.4 Veterinary practitioner caught on property with no prior suspicion of HeV

To minimise risk if a veterinary practitioner is caught on a property with no prior suspicion of HeV, it is strongly recommended a dedicated HeV field kit, which includes the appropriate PPE, cleaning agents, disinfectants and waste disposal bags is complied and available. This will provide veterinarians with ready access to the equipment needed to adequately protect self and others against exposure in situations where an HeV situation arises no prior suspicion or warning.

If HeV is suspected during routine work where no special precautions have been taken:

- minimise exposure—withdraw to a safe area and instruct accompanying people to do the same
- assess the degree of exposure and use soap and water to wash off contamination— shower if necessary (where this is possible)
- notify Biosecurity Queensland of the case
- if HeV is highly suspected from the case definition and exposure has occurred, seek prompt medical advice and also contact the local Queensland Health Population Health Unit—obtain the number of the local unit from the telephone book and have it handy at all times
- if the case has been assessed with Biosecurity Queensland as a suspect case (i.e. if HeV is one of a number of differential diagnoses), assess whether it is safe to proceed (including assistants) and that the level of PPE is adequate. Only if it is safe to proceed and the level of PPE is adequate, continue with the investigation as per 5.6.2
- do not proceed until it is safe to do so and the necessary PPE and protection is available— then proceed as in 5.6.2
- if the case is assessed as a highly suspect case with Biosecurity Queensland, then proceed according to advice received from Biosecurity Queensland.

5.6.5 Sample taking from live and dead horses

The approach to sampling should reflect the serious zoonotic potential of HeV infections and the appropriate measures that can be taken to avoid exposure.

STRINGENT BIOSECURITY PRECAUTIONS SHOULD BE TAKEN WHILE CONDUCTING ANY SAMPLING ON SUSPECT HeV CASES.

This section describes samples taking from live horses and from dead horses, including post-mortem samples (samples taken after death but not involving necropsy) and samples from a limited necropsy.

- As much information as possible should be recorded on the Specimen Advice Sheet (SAS) that needs to accompany the samples to the laboratory. Clearly write **Hendra Virus exclusion, Urgent Priority** on the SAS.

Veterinary assessment of the risks associated with taking samples from both live and dead horses is required. Veterinary practitioners need to form their own view on what is safe and appropriate in each situation and proceed accordingly.

Note: HeV should be excluded as a possible cause before any necropsy for insurance purposes takes place. If the horse is insured, the insurance company needs to be informed that only samples or a limited post-mortem is being performed due to the concerns of HeV infection.

Live horses—both suspect and highly suspect cases

Note: If sampling opportunity is limited, the most valuable samples are a nasal swab and whole blood in EDTA.

Preferred samples

- Nasal swab: only taken if there is no risk of personal contamination whilst collecting.
 - preferably transported in virus transport medium but swabs not transported in Virus Transport Medium (VTM) can be PCR (polymerase chain reaction) tested; and
- Oral swab (taken from the surface of the tongue): only taken if there is no risk of personal contamination whilst collecting.
 - preferably transported in virus transport medium but swabs not transported in VTM can be PCR tested; or

- Blood sample
 - 1 x 10 ml of whole blood in a plain tube; and
 - 1 x 10 ml of blood in EDTA (ethylenediaminetetraacetic acid) and, if possible
- Urine swab (taken from a urine stream, or from the ground immediately post-urination)
 - preferably transported in virus transport medium but swabs not transported in VTM can be PCR tested.

Dead horses—suspect cases

Post-mortem sampling

Biosecurity Queensland recommends that private veterinary practitioners should only consider conducting post-mortem sampling of suspect dead horses if they are confident with their PPE, infection control and sampling practices.

The minimum recommended post-mortem samples to exclude HeV are:

- Nasal swab
 - preferably transported in virus transport medium but swabs not transported in VTM can be PCR tested;
- Oral Swab (taken from the surface of the tongue)
 - preferably transported in virus transport medium but swabs not transported in VTM can be PCR tested; and if possible
- Blood if available:
 - whole blood, 1 x 10 ml plain tube if available
 - EDTA blood, 1 x 10 ml if available.

Limited necropsy

A limited necropsy will increase the likelihood of reaching a conclusive diagnosis.

Note: necropsy is the activity that poses the highest risk of transmission on account of the viral load known to be present throughout most organs, tissues and body fluids of infected horses. Biosecurity Queensland recommends that a veterinarian should not consider performing a necropsy unless is trained in the appropriate safe work practices, necessary Personal Protection Equipment (PPE), understand WPH&S obligations and is experienced at performing post-mortems on horses.

See Section 6 for a description of a limited necropsy as used by Biosecurity Queensland if a decision is made to proceed with necropsy sampling.

A limited necropsy is aimed at collecting fresh and fixed samples (in 10% formalin) from lung and/or spleen and/or kidney and/or fresh urine.

- Lung—fresh and fixed
 - access to the lung should be by ‘keyhole’ approach to minimise exposure
 - for detailed outline of the keyhole approach to collect lung see section 6.
- Spleen—fresh and fixed
 - access through abdominal wall, with the horse lying on its right side, noting peritoneal fluids may be contaminated
- Kidney—fresh and fixed
 - access through abdominal wall noting peritoneal fluids may be contaminated
- Urine—fresh
 - access through abdominal wall noting peritoneal fluids may be contaminated.
- Superficial lymph nodes of the head, for example, submandibular lymph nodes

- Note: for inexperienced operators or those not prepared to safely manage a limited necropsy, please refer back to Post Mortem Sampling above for minimal sampling of a dead horse.

All samples must be placed in sealed containers and be decontaminated off the premises when exiting, as described in 5.6.3 Entry/exit procedures.

Dead horses—highly suspect cases

For horses that meet a highly suspect case definition, Biosecurity Queensland recommends that private veterinary practitioners should only consider conducting post-mortem sampling of highly suspect dead horses if they are **confident with their PPE, infection control and sampling practices**.

A veterinary practitioner should first notify and consult Biosecurity Queensland before proceeding with an investigation of a highly suspect case.

Post-mortem sampling

The minimum recommended post-mortem samples to exclude HeV are:

- Nasal swab
 - preferably transported in virus transport medium but swabs not transported in VTM can be PCR tested;
- Oral swab (taken from the surface of the tongue)
 - preferably transported in virus transport medium but swabs not transported in VTM can be PCR tested; and if possible
- Blood if available
 - whole blood, 1 x 10 ml plain tube if available
 - EDTA blood, 1 x 10 ml if available.

Limited necropsy

Limited necropsy on highly suspect dead horses should not be undertaken without first consulting Biosecurity Queensland.

Note: necropsy is the activity that poses the highest risk of transmission on account of the viral load known to be present throughout most organs, tissues and body fluids of infected horses. Biosecurity Queensland recommends that a veterinarian should not consider performing a necropsy unless is trained in the appropriate safe work practices, necessary Personal Protection Equipment (PPE), understand WPH&S obligations and is experienced at performing post-mortems on horses.

If a veterinarian is in any way uncomfortable about performing a limited necropsy on a horse suspected of dying from HeV infection, then the precautionary principle should apply and the veterinarian must seek alternative advice or refer back to Post Mortem Sampling above for minimal sampling of a dead horse.

Note: because of the serious zoonotic potential of HeV infection, if human exposure is thought possible then an accurate rule in/rule out diagnosis is required on public health grounds. If Queensland Health deem this is required, then it is unlikely such a diagnosis can be confidently made without the laboratory testing of appropriate specimens—blood, lung, spleen, liver, kidney and lymph nodes of the head. Other tissues such as brain and spinal cord are useful but are of secondary importance. Note previous warnings : a necropsy of this level will require specialist training.

Note that the person in charge of the autopsy has legal obligations under the [Workplace Health and Safety Act 1995](#). Accordingly, the person in charge must inform others of the risk and only allow persons who are appropriately trained and provided with appropriate PPE to assist and must ensure that such persons adopt safe work practices and wear the PPE. The person in charge must supervise all others present.

Conduct of a limited necropsy

See Section 6 for a description of a limited necropsy as used by Biosecurity Queensland.

- Ensure that the approach to the necropsy, available equipment and PPE allow the procedure to be conducted safely.
- Minimise the number of people involved.
- Isolate necropsy site from other animals.
- If disposal is to occur on property, the ideal necropsy site will be next to the disposal site.
- If a carcass has to be moved to be necropsied the head must first be enclosed securely with an impervious plastic bag to prevent discharges to the environment. The bag must be disposed of with the carcass. Discharges of urine and any other body fluids need to be disinfected using the chosen disinfectant.
- Ensure assistants are provided with an appropriate level of information, instruction, training and supervision to perform their role safely, and ensure that they follow safe work practices and instructions and wear the required PPE correctly.
- Ensure the work site is safe—trip hazards, adequate light etc.
- Conduct the minimum necropsy necessary to obtain the samples that are safe to get (See section 6—A limited necropsy approach as used by Biosecurity Queensland).
- Undertake gross clean down/disinfection of equipment and personnel at the site with final decontamination done at the entry/exit point as per section 5.6.3.
- Double bag items that cannot or are not being decontaminated.
- Supervise or advise on disposal, then decontaminate the area OR give instruction to keep the area isolated until sufficient disinfectant and gear is available to dispose and decontaminate.

When decontaminating, avoid generating splashes and aerosols (e.g. do not use a high-pressure hose) and ensure items and equipment are immersed fully during cleaning.

For further information contact Employment and Industrial Relations, Workplace Health and Safety Queensland on 1300 369 915 or Biosecurity Queensland.

5.6.6 Sample dispatch

There are packaging requirements that must be met to transport samples by road, rail or air. Requirements apply to all samples sent by private veterinary practitioners to a laboratory. For example, International Air Transport Association (IATA) Packing Instructions 605 and 602 apply to many of the samples sent by veterinarians. More information can be obtained from the internet by entering 'IATA packing instructions' into a search engine.

Training from an accredited provider is required for the packing of some categories of samples. This would include most samples from HeV suspect cases. Training can be obtained from private providers.

Some courier companies will provide a complete service—that is, they will come to a veterinary practice, pack and dispatch the samples correctly. Veterinary practices are recommended to establish an account with a courier service of their choice so that samples for HeV testing can be dispatched for testing without delay. A previously established account is usually required for a courier service to make a collection.

Notes on dispatch of samples:

- Samples must be dispatched to a government laboratory. Private laboratories do not conduct HeV exclusion testing.
- Notify the laboratory that HeV samples are coming by telephoning the laboratory liaison officer on 07 3362 9471.
- The veterinarian will be responsible for the dispatch of samples and cost of transport to the laboratory. Note: a government laboratory will provide Hendra exclusion testing free of charge but exclusion testing is unlikely to identify a cause if samples are HeV negative.
- Fill out a Specimen Advice Sheet (SAS) with all details—this paperwork is essential. Place the specimen advice sheet outside the sample package so it can be read before the package is opened. A copy of the SAS is available from the DPI&F Hendra Virus website: www.dpi.qld.gov.au/cps/rde/dpi/hs.xsl/4790_6661_ENA_HTML.htm
- Clearly write **Hendra Virus exclusion, Urgent Priority** on the SAS.
- Note that private laboratories will forward samples to a government laboratory if necessary; however, this will add more time until results are available. This also makes the private laboratory the submitter of the samples and the government laboratory will report results back to the private laboratory as the submitter. From there they will go back to the veterinarian.
- If within easy driving distance of a Biosecurity Queensland veterinary laboratory (located in Brisbane, Toowoomba and Townsville), an option is to pack the samples safely (ensure the samples are contained within an appropriate second or outer container to prevent spillages) and drive them to the lab. Before departure, notify the laboratory liaison officer on 07 3362 9471 that these samples will be arriving.
- Samples should be kept sealed, double bagged if necessary, to avoid any exposure.
- Samples should be kept refrigerated.

5.6.7 Disposal of carcass

Where HeV is not diagnosed or not suspected as a result of an investigation, the carcass can be disposed of by the owner using their normal methods.

Where HeV is suspected or diagnosed, the attending veterinarian and the person in charge have an obligation to ensure any potentially infectious animal does not pose a risk of infection to other animals or people and does not cause environmental contamination.

Immediate advice includes:

- Isolate the carcass from all people and other animals until a disposal method is finalised and can be undertaken safely.
- Disposal on property can be arranged if deep burial is possible on the property. Deep burial should aim to have a minimum covering of soil over the carcass of 1–2 metres.
- If it is essential to clean and disinfect the site, avoiding splashes and aerosols of such a clean-up for personal safety.
- If unsure, isolate the carcass and contact Biosecurity Queensland.

Note: costs associated with the disposal of horses are considered as costs to be covered by the owner of the horse.

5.6.8 Downtime

Personal downtime refers to the time that should be spent away from other animals to prevent possible spread of HeV. It is more the time taken to complete a series of actions than a definitive time. It is recommended that there is no contact or only minimal contact with other animals or people until the following actions are completed:

- Wash exposed areas of skin thoroughly with soap and water.
- Remove and wash dirty clothes in a separate hot wash cycle with detergent (avoid re-contamination when doing this). Do not wash potentially contaminated clothing with other household laundry.
- Take a hot shower with shampoo and soap.
- Dress in clean clothes.
- Put on clean footwear or footwear not worn in the dirty area.
- If HeV is confirmed or highly suspected and potential human exposure has already occurred, people should seek medical advice and also contact the local Queensland Health Population Health Unit.
- Once this has been completed, normal work can be resumed.
- Equipment downtime refers to the time taken to ensure any equipment used or taken into the dirty area is safe and does not pose a risk of disease transmission.
- Where possible, use disposable equipment in the dirty area. This equipment can be double bagged or otherwise sealed safely and held until results are known. If negative, treat as normal waste. If positive, notify Biosecurity Queensland to discuss disposal options.

Equipment to be re-used on other animals must be decontaminated. Circumstantial evidence indicates that equipment can act as a fomite and transfer infection between horses.

- Most of this equipment should have been decontaminated during exit of the dirty area. Double check for any remaining organic material and repeat the decontamination process if present.
- Wear the PPE in section 5.5.3 when decontaminating equipment and avoid generating aerosols and splashes.
- Guidelines from infection control practices in human medicine require equipment to be cleaned with detergent and water prior to soaking in a disinfectant (i.e. the equipment is not to be scrubbed or dipped in the disinfectant without prior cleaning). The rationale being that without prior cleaning, the disinfectant may be unable to penetrate through the organic matter to adequately disinfect the surface. Also, some disinfectants (e.g. sodium hypochlorite) are less effective in the presence of organic matter or 'fix' the organic matter onto the surface (e.g. aldehydes).
- Standards for cleaning, disinfecting and sterilising equipment are set down in Australian Standard 4815 'Office-based healthcare facilities—reprocessing of reusable medical and surgical instruments and equipment, and maintenance of the associated environment'. Contact Division of WH&S for a copy of this on 1300 369 915 or online at the WHSQ website www.whs.qld.gov.au
- Equipment that cannot be properly decontaminated on the premises by cleaning and disinfecting should be taken off the premises double bagged or otherwise sealed. If possible, leave sealed until results are known. If negative, clean as per practice routine.
- If positive or if equipment cannot be isolated for this long, then the person cleaning should don PPE, remove equipment from its sealed container, clean with detergent and water and complete the process with a recommended disinfectant.
- Note that if long-term contact with some of the disinfectants recommended could cause harm to the equipment. Leave in contact with the disinfectant for the recommended time as per label directions and then wash off.
- Check your vehicle for degree of exposure to contaminated items and decontaminate using a recommended disinfectant. Do not forget the steering wheel, door handles, floor mat.
- Seek advice from Biosecurity Queensland as required.

When equipment has completed this process, it can be re-used.

5.7 Biosecurity advice to owner

It is important to advise the owner of the zoonotic potential of HeV and of steps to take to manage their risk of exposure.

If HeV is confirmed or highly suspected and potential human exposure has already occurred, people should seek medical advice and also contact their local Queensland Health Population Health Unit.

Advice can include:

- isolation of sick or dead horses from other horses, people and all other animals including pets
- isolation of any other sick animal that has been associated with the sick or dead horses
- only the minimum number of essential people are to conduct the minimum maintenance needs of all horses/sick animals on the property
- selection and correct use of PPE for contact with sick/dead horses and their excreta and other animals where exposure to blood and body fluids (including saliva and urine) and aerosol or droplets from coughing/sneezing could occur
- maintain a high standard of personal hygiene including frequent washing of hands and exposed surfaces with soap and water
- stop or limit horse movements on and off the property
- stop or limit movements of horse products (such as manure) and equipment (such as tack, dental equipment) off the property
- visiting horse practitioners such as farriers to return at a later time or only to work on healthy horses on the property if that work is essential
- give a strong recommendation to seek medical advice if at all concerned with personal health issues
- costs associated with disposal and ongoing care of remaining horses are treated as normal costs and paid by the owner
- costs of packaging and transport of samples to a government laboratory are the responsibility of the submitting veterinarian
- costs of conducting the laboratory testing are met by government
- advise that testing samples can be complicated and may take up to several days until a result can be given
- advise that the property will be quarantined by Biosecurity Queensland if they assess there is a strong suspicion of HeV or when they receive confirmation of HeV from sample results.

5.8 Media and public communication

It is important that any cases of HeV disease are openly and accurately communicated to the public.

Any media enquiries should be directed to the Biosecurity Queensland's media unit. This allows a consistent approach to be taken by people who have the best access to all information about the overall situation.

It is also recommended that all media approaches to non-departmental government officers be directed to Biosecurity Queensland's media unit.

The Chief Veterinary Officer will keep the Australian Veterinary Association and Equine Veterinarians Australia and other appropriate bodies updated and will notify them of significant events as soon as possible so that veterinarians can make informed decisions during their normal work routine.

If any non-government person is approached directly by the media, they have the right to refuse to comment. If they do choose to comment, it is recommended that only facts are presented, that they are not drawn into conjecture and that they comment only on the part of the operation they were directly involved in.

6. Limited necropsy approach — as used by Biosecurity Queensland

Note: necropsy is the activity that poses the highest risk of transmission due to the viral load known to be present throughout the organs, tissues and body fluids of an infected horse.

This limited approach may not allow a diagnosis of the actual cause of disease to be made if HeV tests are negative. It is not a substitute for a thorough autopsy which is the most effective way to investigate a range of differential diagnoses.

Reflect skin from midline back over thorax.

- If safe and the necessary equipment is available, create a 'door' in the rib cage by removing two or three anterior ribs (with secateurs or bone cutters, not an axe) for adequate exposure, and examine the lungs and pleura in situ. Watch for splinters of bone that may penetrate gloves, consider using heavy duty/non-cut gloves for this activity. Large amounts of thoracic fluid, visibly haemorrhagic lungs and dilated pulmonary lymphatics over the pleural surface would support a diagnosis of HeV.
- Collect a fresh portion of lung and also take a sample for formalin fixation. Lung pathology is used to diagnose Crofton weed poisoning; for example, the most common differential diagnosis in Queensland. Blood and blood-stained frothy fluid in the lungs would support a diagnosis of HeV.
- Similarly, remove some posterior ribs or abdominal wall to expose the spleen and kidney.
- Collect fresh portions of spleen, kidney and urine.
- Replace the reflected skin back over the rib cage and abdomen.
- Complete a specimen advice sheet and dispatch samples to the regional DPI&F laboratory as soon as possible. Place specimen advice sheet outside the sample package so it can be read before the package is opened.
- Where the veterinarian present is experienced and trained in the use of PPE, and where that veterinarian makes a favourable risk assessment about proceeding further and where the situation permits, a more thorough autopsy could be undertaken to collect a wider range of samples.

Appendix 1 Hendra Virus Incident Summary table

Cluster	Location	Date	Positive human cases	Horses with positive laboratory test	Horses with untested or unresolved status*	Other evidence
1	Mackay	Aug 1994	1 (1 death)	2		These cases did not become apparent until late 1995 when Hendra virus infection was confirmed in a person from Mackay. Testing of stored samples

2	Hendra (Brisbane)	Sep 1994	2 (1 death)	7	13	from horses did not occur until late 1995, after confirmation of Hendra virus involvement in the associated human case. Hendra virus was first identified and characterised as a result of this event. No diagnostic tests were available until after the event and not all horses were tested as samples were not retained from all horses. Strong epidemiological evidence exists for all horses involved to be considered as cases based on concurrence of disease and other data. Positive tests include 7 sero-positive horses.
3	Cairns (Trinity Beach)	Jan 1999		1		
4	Cairns (Gordonvale)	Oct 2004	1		1	Strong epidemiological evidence exists for this horse. A veterinarian was confirmed positive for Hendra virus after performing a post mortem on a horse that died suddenly with signs consistent with Hendra. No samples from the horse were available for testing. The horse was the only identified potential source of virus. A description of the clinical and post mortem signs is strongly suggestive of Hendra virus.
5	Townsville	Dec 2004		1		
6	Peachester	June 2006		1		
7	Murwillumbah	Oct 2006		1		
8	Peachester	June 2007		1		
9	Cairns (Clifton Beach)	July 2007		1		

10	Redlands	June 2008	2 (1 death)	5	3	Three horses have unresolved Hendra status. 3 horses died at Redlands Veterinary Clinic in the month prior to the first confirmed case with clinical signs consistent with possible Hendra cases. Post-mortems were not completed on the horses and only limited laboratory samples were available to allow further testing. The samples were negative for Hendra virus on the tests able to be undertaken. Positive tests include 1 sero-positive horse.
11	Proserpine	July 2008		3	1	One horse has unresolved Hendra status. 1 companion horse was found dead several days prior to the first confirmed case. Limited clinical history consistent with Hendra virus infection was available. A post mortem was not performed. Positive tests include 1 sero-positive horse.
Total			6 (3 deaths)	23 (all deceased)	18 (all deceased)	

A case is taken as a horse that has been tested positive for HeV, including serological, molecular or other diagnostic testing techniques, or where there is a very high level of likelihood of being infected with HeV as demonstrated by other test results.

* as further information becomes available, the status of these horses may change.