



REVISION OF ACDP/SEAC GUIDANCE ON “TRANSMISSIBLE SPONGIFORM ENCEPHALOPATHY AGENTS: SAFE WORKING AND THE PREVENTION OF INFECTION” (THE TSE GUIDANCE)

REVISION OF PARTS 3 AND ANNEX D OF THE GUIDANCE

Issue

1. The original guidance on “Transmissible Spongiform Encephalopathy Agents: Safe Working and the Prevention of infection” was published in March 1998, and was prepared by the Advisory Committee on Dangerous Pathogens and SEAC, in consultation with the HSE. The guidance represented what was considered to be best practice by Members of the Committees and provides advice on work with TSEs in experimental and clinical settings. It is aimed at people who work with animal or human TSEs in the laboratory, and provides advice to those involved in the management and care of patients; on the handling of deceased patients; and on the minimisation of risks to other patients and staff. It does not cover incidental exposure such as on farms, abattoirs or other work with animals.
2. In view of the many uncertainties within the fields of TSEs, there is an ongoing need to review the guidance on a regular basis.

Background

Revising the TSE guidance

3. A sub-group of the ACDP/SEAC TSE Joint Working Group (JWG) is up-dating the guidance. The new guidance will be available on the Internet, and sections will be published as they are finalised and approved. SEAC has already seen (paper SEAC 76/3) and endorsed revised Parts 2 and 4, along with several new and revised Annexes. (Annex A - Distribution of TSE Infectivity in Tissues and Body Fluids, Annex B - Diagnostic Criteria, Annex E - Quarantining of Surgical Instruments, Annex I – After Death)

4. A revised [Part 3](#) (*Laboratory containment and control measures*) and a new Annex ([Annex D - Transport of TSE infected material](#)) have been produced by the sub-group and approved by the TSE JWG. The TSE JWG is now content for these to be presented to SEAC for its approval.

Revisions to Part 3

5. The main change has been to consolidate all guidance relating to working with TSE agents in a laboratory setting, which was previously scattered throughout the document. Part 3 now addresses the general principles for working with TSE agents; with specific advice included for experimental and diagnostic work, including animal research. Clarification of the requirements for working with low risk specimens has also been included.
6. The advice in Part 3 has been presented to make it as user-friendly as possible. The change in style also addresses the unique way in which information can be imparted via the Internet. For example, 'Infoboxes' have been included to highlight key points, such as working with material collected from surveillance schemes.
7. The guidance in this Part has also been expanded, for example:
 - explaining which agents the guidance covers (paragraph 3.3);
 - including advice on how to classify and categorise the agents (paragraphs 3.3–3.10); and
 - clarifying the requirements for experimental work (paragraphs 3.19–3.21) and those for diagnostic work (paragraphs 3.22-3.29).
8. Part 3 has been updated to reflect the requirements of the new Control of Substances Hazardous to Health (COSHH) Regulations 2002. This includes emphasising how to perform a risk assessment for work with TSE agents; adding the requirement for employers to ensure their employees are trained to handle emergency situations (paragraph 3.15); and setting out the control hierarchy required under COSHH for post mortem examination (paragraph 3.47).
9. Signposts to useful additional guidance have been included, for example:
 - the Advisory Committee on Genetic Modification's compendium of guidance, useful for those working with TSE agents that have been cloned (paragraph 3.2);

- British Standards for protective gloves (Infobox following paragraph 3.42); and
- Environment Agency requirements when disposing of waste (paragraph 3.45).

Annex on the transport of TSE-infected material

10. The TSE JWG suggested that clear guidance on legislation relating to transport of TSE-infected material would be beneficial, and so an additional Annex (Annex D) has been drafted for this purpose. There are several pieces of national legislation covering the transport of dangerous materials. These are listed in the revised guidance, and include:

- The Carriage of Dangerous Goods by Roads Regulations 1996;
- The Carriage of Dangerous Goods by Rail Regulations 1996

There are also two new European agreements that are soon to be implemented in the UK:

- European Agreement concerning the international carriage of dangerous goods by road (ADR)
- and Regulations concerning the international carriage of dangerous goods by rail (RID).

11. Annex D also addresses issues such as:

- how TSE infected material is classified under the Regulations and hence which UN packaging and carriage requirements apply;
- packing instructions;
- how to label specimens; and
- how and by whom material (including animals) can be transported.

Advice sought from the Committee

12. Members are invited to

- consider the revised Part 3 and new Annex on transport, and comment on any aspects as necessary; and
- agree that, providing the ACDP also accept these sections at their meeting in March, they can be recommended to Ministers and the Health and Safety Commission for publication.

Part 3**LABORATORY CONTAINMENT AND CONTROL MEASURES****Introduction**

3.1 This section gives advice on safe working practices to help prevent the transmission of TSE agents during laboratory work with such agents or material that contains or may contain them. It covers:

- all experimental work with preparations derived from body fluids, including work with abnormal purified prion proteins or tissues known or likely to contain either human or animal TSE agents;
- all diagnostic laboratory work with preparations derived from body fluids or tissues known or likely to contain human or animal TSE agents – this includes work with animal tissues derived in the field for onward supply to laboratories for investigation where appropriate, for example, tissues derived for surveillance purposes; and
- research work with infected animals.

Infobox: Surveillance schemes

Appropriate containment measures for work with tissues derived for surveillance purposes will depend on what is known about the incidence of infection in the population that is being studied. For example, if previous results have indicated that the number of positive results is low an appropriate risk assessment may show that Containment Level (CL) 2 is appropriate for work with tissues.

Data from current VLA surveillance scheme - positive confirmation of BSE or scrapie incidence (as of 31/12/2002):

In 'high risk' cattle

	Fallen stock (OTM)		Casualties (OTM)	
	%	Actual	%	Actual
2001	0.35	86/24660	0.59	231/39487
2002	0.16	118/73055	0.34	380/111633

Healthy cattle submitted to OTMS

	%	Actual
2001	0.007	1/14320
2002	0.008	12/142887

Casualties on arrival at abattoir (2002)

	%	Actual
Over 30 months old	0.12	3/2474
24-30 months old	0	0/961

Sheep (scrapie) (2002)

	%	Actual
Fallen stock	0.73	6/823
Abattoir	0.08	24/28502

3.2 Guidance on work with any hosts or vectors in which TSE agents have been cloned using genetic modification and where expression may be achieved is given in the Advisory Committee on Genetic Modification's Compendium of Guidance (www.hse.gov.uk/hthdir/noframes/acgmcomp/acgmcomp.htm).

Formal classification of TSE agents

3.3 The causative agents of the following diseases are all classified as Hazard Group (HG) 3 agents as listed in the Health and Safety Commission's Approved List of Biological Agents (<http://www.hse.gov.uk/hthdir/noframes/agent1.pdf>).

- Creutzfeldt-Jakob disease (CJD) including variant CJD (vCJD);
- Gerstmann-Sträussler-Scheinker Syndrome (GSS);
- Kuru;
- Fatal Familial Insomnia (FFI);
- Bovine Spongiform Encephalopathy (BSE) and other animal TSE agents, including feline spongiform encephalopathy (FSE), spongiform encephalopathy (SE) in captive exotic ungulates, transmissible mink encephalopathy (TME) and chronic wasting disease (CWD). BSE experimentally transmitted to other species is also included.

3.4 The appropriate containment level for an agent is derived from the hazard grouping of the agent. When working with an agent (e.g. propagation or concentration) in a particular hazard group, COSHH requires that the containment level selected must match the hazard group of the agent as a minimum. Although TSE agents are formally classified as HG3 (see paragraph 3.3), the containment measures used may not necessarily fully meet Containment Level 3 (CL3) because of the agent's unique features (the reason for this is explained later). The hazard group of the TSE agent forms the basis of a risk assessment to determine the appropriate containment and control measures.

3.5 Based on the current Hazard Grouping of TSE agents, the recommended overall Containment Levels are given in Table 3a below. Work is categorised according to the type of infectious agent and, for work with animals, the species being infected. Work with human TSE agents includes primary sources and any sub-passages of human derived agents in other species. Work with any animal TSE agent passaged in primates or in genetically modified mice with the human PrP gene should also be considered.

Infobox: Categorisation of work with scrapie

The causative agent of scrapie (and other TSE agents known not to be linked to BSE) is not listed in the Approved List of Biological Agents because there is no evidence of transmission of disease to humans to date. However, as a precaution, work with well characterised laboratory strains of scrapie should be carried out at CL2.

Recent concern about BSE transmission from sheep has led to a debate on whether all scrapie strains should be handled at CL3. As this debate is ongoing, a precautionary approach should be adopted where extra precautions, above those normally required at CL2, may be necessary for handling unidentified field isolates.

Table 3a**Containment Levels recommended for work with TSE agents**

Laboratory work with:	Overall Laboratory Containment Level	Animal Containment Level
Human TSE Agents BSE and agents from animals with related TSE (FSE, SE in captive, wild bovines and felines) or any sub-passaged agents from these in any species TME and CWD	3	3 – small animals 1* – large animals
Scrapie agents	2	2 - small animals 1* - large animals
* ACL1 applies to housing of animals only, additional precautions will be required when working with such animals – see paragraphs 3.30 to 3.47		

3.6 As well as the properties of the agent affecting the containment measures used, there may be other circumstances where consideration may be given to changing the containment measures to reflect the likely exposure of workers to TSE agents. **However, any decision to change the containment conditions should only be taken after performing a local risk assessment (see COSHH ACoP and Guidance, in particular Schedule 3 and Appendix 2) that takes into account:**

- the nature of the work;
- the quantity and type of material being handled; and
- the procedures and equipment that will be used – consider the potential for dispersal of the agent, for contamination of workers, equipment or surfaces at all stages of the activity including handling, processing and disposal, and for contamination during the setting up, servicing and maintenance of the equipment.

3.7 Having completed the risk assessment, local rules/standard operating procedures should then be prepared detailing safe working practices. Specific guidance on the situations where containment measures can be changed is given in the following sections.

3.8 Although in many respects the requirements of a CL3 laboratory are outwardly similar to CL2 laboratories, because of the more hazardous nature of the agents the standards that must be achieved are higher. The key differences between CL3 and CL2 laboratories relate to the way in which they are managed, the need for special training, and the degree of

supervision, in addition to the physical requirements of the laboratory itself. In terms of work with TSE agents, managers should ensure that:

- staff are competent and trained to carry out the work;
- they have received suitable information, instruction and training about risks; and
- there is appropriate supervision of the work in question.

3.9 Guidance on these aspects of laboratory management is given in the '*Management, design and operation of microbiological containment laboratories*'.

3.10 It should be noted that changing some of the physical containment measures does not imply that the work can be carried out at CL2. But, subject to following the guidance set out in the subsequent sections, a CL2 laboratory may be appropriate for certain types of work (see paragraphs 3.27 and 3.28).

GENERAL APPROACH TO SAFE WORKING PRACTICES APPLICABLE TO ALL LABORATORY WORK WITH TSE AGENTS

3.11 This general approach applies to all laboratory work whether human or animal diagnostics and to research work.

3.12 '*The management, design and operation of microbiological containment laboratories*' provides guidance on the management of biological agents including TSE agents, in the laboratory environment. The guidance sets out the standards for CL2 and CL3 microbiological laboratories, and it should be read in conjunction with this guidance which sets out the specific and/or additional requirements for work with TSE agents. The ACDP guidance '*Working safely with research animals: Management of infection risks*' should also be read in conjunction with this guidance. The essential features of CL2 and CL3, as required by COSHH, are shown in Table 3b below.

Table 3b: Containment measures for CL2 and CL3 laboratories

Containment measure	Containment level	
	2	3
Air handling		
The work place is to be maintained at an air pressure negative to atmosphere	No	Yes
Input and extract air to the workplace are to be filtered using high efficiency particulate absorption (HEPA) or equivalent	No	Yes, on extract air
Security and access		
Access is to be restricted to authorised people only	Yes	Yes
The workplace is to be separated from any other activities in the same building	No	Yes
Efficient vector control, e.g. rodents and insects	Yes, for animal containment	Yes, for animal containment
An observation window, or alternative, is to be present so that occupants can be seen	No	Yes
Safe storage of biological agents	Yes	Yes
A laboratory is to contain its own equipment	No	Yes, as far as is reasonably practicable
Disinfection and disposal procedures		
The workplace is to be sealable to permit disinfection	No	Yes
Specified disinfection procedures	Yes	Yes
Surfaces impervious to water and easy to clean	Yes, for bench	Yes, for bench and floor (and for walls for animal containment)
Surfaces resistant to acids, alkalis, solvents and disinfectants	Yes, for bench	Yes, for bench and floor (and for walls for animal containment)
Incinerator for disposal of animal carcasses	Accessible	Accessible
Protective equipment and procedures		
Infected material, including any animal, is to be handled in a safety cabinet, isolator or other suitable containment	Yes, where aerosol produced	Yes, where aerosol produced

General protective measures

3.13 General, basic protective measures should be used wherever there is a risk of exposure to potentially infectious material, including TSE agents. These measures are summarised in Table 3c in the context of working with TSE agents.

Table 3c GENERAL PROTECTIVE MEASURES

- apply general good hygiene measures such as not eating, drinking, smoking or taking medication in the laboratory
- protect skin wounds such as cuts, abrasions, eczematous lesions with water proof dressings
- wear the appropriate protective clothing routinely – consider the use of disposable gowns and wear disposable gloves for all work with TSE material
- wear eye protection or full face visor to protect eyes and mucous membranes from splashes with potentially infected material
- minimise the use of sharps (needles, knives, scissors and laboratory glassware) wherever possible
- consider the use of suitable hand protection such as armoured glove(s) where the use of sharp instruments is essential (see Infobox following paragraph 3.42) e.g. in post mortem examinations or the collection of human or animal brain/spinal cord
- remove protective clothing and wash hands before leaving the laboratory
- use closed systems such as sealed centrifuge buckets or where appropriate a Microbiological Safety Cabinet (MSC) to protect against splashing of material when mixing, centrifuging or homogenising samples
- use plastic single-use disposable items (containers, pipettes, inoculating loops and other such instruments); in the case of large items this could be interpreted as specified parts of the item e.g. dedicated ultracentrifuge rotors or electron microscope grids
- use recommended decontamination procedures – see Annex C

Cleaning and decontamination

3.14 As many of the standard methods of decontamination cannot ensure complete inactivation of TSE agents, the emphasis must be on the removal of the agent by thorough cleaning, followed by an appropriate autoclaving or liquid chemical treatment. Annex C gives detailed guidance on cleaning, decontamination and waste disposal.

Handling emergencies

3.15 There should be plans in place in the laboratory to deal with accidents involving TSE agents, for example dealing with spillages or first aid arrangements for inoculation injuries. Employees must report immediately to their employer, or any of their employer's other employees with specific responsibility for health and safety, any accident or incident that results in the release of a TSE agent. The training of employees working with TSEs should prepare them for this responsibility. The training should include highlighting the readily foreseeable incidents that could occur and the procedures for dealing with accidents,

incidents and emergencies, and the name of the person or people to whom accidents should be reported.

3.16 Spillages should be handled according to the guidance in Annex C. Any inoculation injury or contamination of broken skin with TSE agents (or material that contains the agents) should be gently encouraged to bleed, washed (not scrubbed) with warm soapy water and covered with a waterproof dressing. Disinfectants should not be put onto cuts or broken skin, as this could impair the body's localised defence reaction to the injury.

3.17 An official local record should be kept of any incident or occurrence that involves exposure to TSE agents. Certain incidents will need to be reported to HSE under RIDDOR (see Part 2, paragraph 2.25).

Transport of specimens

3.18 All TSE-infected specimens of human and animal origin are classed as infectious substances for the purposes of transport. Guidance on the transport of this material is given in Annex D.

EXPERIMENTAL WORK WITH TSE AGENTS

3.19 As previously outlined, it may not be necessary to use all of the measures normally required at CL3 but any decision to dispense with certain CL3 containment measures should only be made on the basis of a local risk assessment (as described in paragraph 3.6 above). The assessment must be specific to the laboratory and the work that is being carried out.

3.20 Following a risk assessment, which may indicate that other risks require the use of full CL3 (for example, if other HG3 biological agents are likely to be present – see Table 3b), the main physical containment measures that might be dispensed with for experimental work follow.

- The need for the laboratory to be sealable to permit fumigation, as the TSE agents are not affected by normal fumigants. Therefore, another means of decontamination for TSE agents, in particular in the event of a major spillage, will need to be addressed in a local code of practice/Standard Operating Procedures.
- It may not be necessary for the laboratory to be maintained at negative pressure. For example, if the work only involves the handling of small volumes of liquid, the work could be carried out within the confines of an appropriate microbiological safety cabinet – all such devices will have HEPA filtered exhausts. If a cabinet is used, consideration will need to be given to the routine disinfection of surfaces and also the action to be taken when the cabinet requires servicing. If, however the work involves activities that can spread contaminated material around and outside the laboratory, for example, block cutting, local exhaust ventilation may be required to control the spread of contaminated material. In addition, maintaining an inward airflow may further help to control the spread of contaminated material outside of the confines of the laboratory.

3.21 There may be certain experimental situations where the amount of TSE agents present is likely to be significantly higher than levels normally encountered in naturally occurring

disease, or else the risk of exposure is increased because of certain activities, for example when material containing TSE agents is disrupted or concentrated by homogenisation or centrifugation. If this is the case, such situations should be carefully assessed and it may be necessary to work at full CL3.

DIAGNOSTIC LABORATORIES

3.22 A range of laboratory tests may be required for the clinical management of patients with known or suspected CJD. Similarly, veterinary diagnostic tests will be needed in herds where BSE may be known or suspected. Diagnostic-type tests may also be carried out on human or animal tissues for surveillance purposes (see Infobox following paragraph 3.1).

3.23 Again, assessment may indicate that not all the containment measures normally required by CL3 are necessary. As before, the main containment measures that might not be required are the need for a sealable laboratory and the requirement for an inward airflow. The assessment must be specific to the laboratory which is undertaking the work, as sample processing procedures and equipment are likely to differ between laboratories.

3.24 CNS samples present the greatest risk of exposure to the TSE agent as compared to other diagnostic specimens and although certain containment measures may be dispensed with (as in paragraph 3.20), additional protective measures will need to be taken as follows:

- care should be taken to avoid accidental inoculation or injury, e.g. when preparing samples for microscopy or culture;
- disposable equipment should be used wherever practicable, e.g. cell counting chambers etc;
- any items contaminated by the specimens should be either destroyed by incineration, autoclaved or disinfected to the required standard (see Annex C for further details);
- any residual contamination of automated equipment should be minimised;
- any residual contamination of equipment should be dealt with before servicing;
- delicate equipment such as microscopes should be cleaned and maintained regularly to avoid accumulation of potentially contaminated debris.

3.25 It may be appropriate for the diagnostic analysis of all brain and neural tissue preparations from known, suspected and at risk patients or animals to be handled in a specialist neuropathology laboratory or centre.

Neuropathology

3.26 In addition to ensuring appropriate containment measures are taken for this type of work (as set out in paragraphs 3.20 and 3.24), it should be remembered that, although standard formalin is used for optimal fixation of whole brain for general histopathology purposes, formalin-fixed TSE tissue may retain infectivity for long periods and should

always be handled with the same precautions as fresh material. Similarly, tissue for electron microscopy fixed in glutaraldehyde retains its infectivity. Formalin-fixed TSE tissue can be decontaminated with formic acid treatment (Taylor DM, Brown JM, Fernie K and McConnell I, 1997) – see Annex C for details. (Formic acid treatment has not been shown to be effective for non-formalin-fixed material.) Once tissue blocks are fixed and acid-treated, sections can be cut on a standard microtome (preferably using a disposable knife) and processed as usual. Debris (wax shavings) from section cutting should be contained (see paragraph 3.20) and disposed of by incineration. The handling of archive material stored in fixative blocks or as mounted slides should also be subject to the same precautions as for fresh material.

Low risk specimens

3.27 This section of the guidance considers work with ‘low’ risk specimens (see Annex A.1 for infectivity of human tissues and Annex A.2 for animal tissues) such as CSF, blood, urine and faeces destined for routine clinical analysis. **This advice should not be interpreted as a means of carrying out any other work with TSE agents, or any other HG3 agents, under such conditions.** In addition to dispensing with measures outlined in paragraph 3.20 other CL3 requirements (above those needed at CL2) may be adapted to enable work on such specimens to take place in a CL2 laboratory. When preparing a risk assessment for work with low risk specimens the following points could be considered.

- The need to separate the work from other activities does not necessarily mean having a separate laboratory, although this would be the preferred solution. Work could be carried out at the beginning or end of a work period.
- If an observation window, or alternative to allow occupants to be seen is not available, then there will need to be some means of checking on staff, for example using CCTV or regular phone calls/agreed check-ins. Such measures will ensure that adequate supervision is in place when individuals are working alone.
- In terms of equipment used for the handling of infectious material, this should be disposable as far as possible or else cleaned thoroughly before being autoclaved.
- The transport of infectious material also needs to be considered. Ideally it should be stored within the room where it is to be handled. If this is not the case, it should be transported in robust, properly labelled, secured containers that should only be opened within the confines of a microbiological safety cabinet.
- Low risk specimens should be autoclaved prior to disposal; further guidance on decontamination and disposal of waste is given in Annex C.
- If a cabinet is used at CL2 to handle material, it should be remembered that although this means that the laboratory is under negative pressure to some extent, given that there is likely to be increased traffic in and out of such a laboratory, this negative pressure will not be constant and so the work should remain within the confines of a cabinet (see also guidance for work with low risk samples in autoanalysers).

Automated analysis of human clinical specimens

3.28 'Low' risk samples can be analysed in a fully enclosed automated system at CL2 providing any manual processing such as decanting is carried out within a microbiological safety cabinet. The low risk of infectivity together with the use of a fully enclosed system is considered sufficient to reduce any risk of exposure to the laboratory worker to a very low level. The assessment of these types of procedures should take into account whether:

- the system is fully enclosed and can contain spillage;
- waste can be disposed of without risk; and
- there are suitable maintenance and emergency procedures in place.

3.29 If the above cannot be ensured, then work should take place under the general conditions described in paragraph 3.27.

RESEARCH WORK WITH INFECTED ANIMALS

3.30 General guidance on laboratory work with infected animals is given in *Working safely with research animals: Management of infection risks*. In general, live animals infected with TSE agents do not pose a significant risk of exposure to TSE agents. However, the nature of experimental work with such animals means that there will be procedures/tasks that increase the risk of exposure.

3.31 There are certain minimum containment requirements for work with animals experimentally infected with TSE agents, as shown in Table 3a. Small animal work includes work with, for example poultry, rodents, rabbits, mink, cats and dogs. Large animal work includes work with, for example, domestic farm animals such as sheep and cattle.

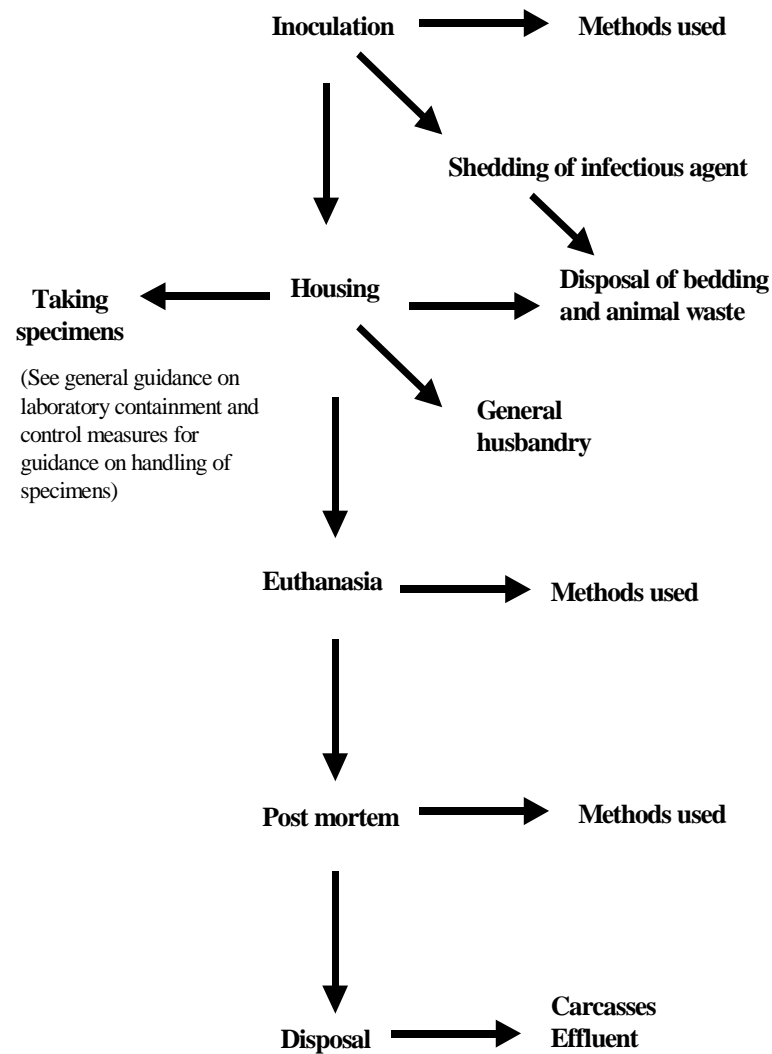
3.32 Generally, the rationale for work with small animals requiring more stringent containment measures than large animals is because of the increased likelihood of biting and scratching when working with such animals. But, as with experimental laboratory work with TSE agents, a local assessment of work at Animal Containment Level 3 may indicate that not all the measures normally required are necessary to control exposure i.e. the room need not be sealable to permit fumigation. The risk of exposure when working with live, non-pregnant large animals such as sheep and cattle is considered remote and Animal Containment Level 1 is appropriate.

3.33 Having identified the appropriate containment level for the work, the local risk assessment of the work must identify all potential exposure points to determine whether other additional precautions are required to control exposure, in particular for work with large animals. Additional precautions may also be required, for example, when concentrations of infectivity above those found naturally might be expected.

3.34 Potential points of exposure are illustrated in Figure 3.1, with further guidance given in paragraphs 3.36 to 3.47.

3.35 Having completed the risk assessment, local rules/standard operating procedures should then be prepared detailing safe working practices.

Figure 3.1: points to consider in assessment



Restraint

3.36 For procedures such as inoculation of infectious material and taking of blood, the need for sedation of the experimental animal should be considered for both animal welfare reasons and to protect staff from injury. If the animal is not to be sedated, the animal should be appropriately restrained and procedures should not be carried out by lone workers. Adult cattle infected with TSE agents can be especially unpredictable and work should only be carried out by experienced staff.

Inoculation

3.37 The route of inoculation of infectious material should be assessed to determine whether this would allow leakage of this material post-inoculation and if this could contaminate bedding etc.

3.38 When infecting by injection, leakage from the injection site should be controlled and any leakage should be soaked up with absorbent material that should be treated as clinical waste. Sealants could also be applied to the wounds to control contamination of bedding etc.

3.39 Consideration should be given to whether inoculum remains exposed for any period of time, as may be the case when using feed as the source of infection.

3.40 As there is potential for excretion of infectious material post inoculation especially when infection is via the oral route (albeit for a limited period of time) (Dickinson, unpublished) then faecal waste and material contaminated by waste, e.g. bedding, should be collected and disposed of by incineration for at least 4 weeks post-inoculation.

Husbandry

3.41 Certain tasks with large animals such as foot trimming, ear tagging, and shearing of sheep may create a risk of exposure to blood and other body fluids. Given the potential for transmission of infection via blood (Houston *et al*, 2000), appropriate precautions should be taken to avoid exposure to blood and accidental puncture wounds. For example, wearing of appropriate personal protective equipment such as gloves which should be cut resistant (NB: cut resistant gloves do not offer protection from penetrating injuries – see Infobox following paragraph 3.42), immediate disposal of needles when administering veterinary treatment and face protection if there is a possibility of exposure to blood under pressure coming into contact with mucous membranes such as the eyes.

3.42 The housing of small animals will need to balance the need for positive pressure, for example to maintain a germ-free environment or else protect immunosuppressed animals, against the need for inward flow of air at CL3. In such cases the use of simple engineering controls (e.g. flexible barriers) or respiratory protective equipment (RPE) may be necessary and should be addressed in the local risk assessment.

Infobox: Protective gloves

Gloves or other hand protection should be capable of giving protection from hazards, be comfortable and fit the wearer. The choice should be made on the basis of suitability for protection, compatibility with the work and the requirements of the user. The ability of the gloves to resist abrasion and other industrial wear and tear should be considered and the manufacturer's instructions and markings for appropriate use and level of protection should be followed. When selecting gloves for chemical protection, reference should be made to chemical permeation and resistance data provided by manufacturers.

Gloves made from chain-mail or leather and metal or plastic arm guards offer some protection against stabs and are used in those aspects of work where a knife is moved towards the user's hand and forearm. Gloves knitted from special man-made fibres such as Kevlar will provide protection against cuts and gloves manufactured from eg Kevlar needlefelt give good puncture resistance.

See also BS EN 374:1994 (Parts 1-3) *Protective gloves against chemicals and micro-organisms*, BS EN 388:1994 *Protective gloves against mechanical risks* and BS EN 1082-1:1997 *Protective clothing. Gloves and arm guards protecting against cuts and stabs by hand knives. Chain mail gloves and arm guards* for further information.

Collection of specimens

3.43 The type of sample required will affect the control measures required. Taking of blood specimens should be carried out so as to avoid exposure to blood and accidental puncture wounds. For example, wearing of appropriate personal protective equipment and immediate disposal of needles (needles should not be resheathed). Face protection may be necessary if there is a possibility of exposure to blood under pressure coming into contact with mucous membranes such as the eyes and the mouth.

Parturition

3.44 As there is the possibility of maternal transmission in sheep and a risk in cattle that cannot be discounted (Race, Jenny & Sutton, 1998; Onodera, Ikeda, Muramatsu & Shinagawa, 1993; Pattison, Hoare, Jebbet & Watson, 1972) infected animals should give birth in a separate area and all non-viable products of parturition, e.g. placentae and any contaminated bedding etc disposed of via incineration. The area should be cleaned and disinfected after use with hypochlorite (20,000 ppm available chlorine). Staff attending large animals should wear appropriate protective clothing, i.e. parturition gown, gloves, face shield/mask.

Disposal of waste

3.45 Carcasses and other associated material, e.g. tissue samples, from all animals experimentally infected with a TSE agent should be disposed of by incineration. Bedding and faecal waste (following any initial shedding phase – see above) can be disposed of in the normal way (e.g. by landfill burial or discharge to the sewer system) subject to the requirements of DEFRA, the Environment Agency [EA] and the Local Authority. (For further information see the duty of care under section 34 of the Environmental Protection Act 1990 on passing clinical waste to a registered carrier for disposal – note, the EA are still consulting on technical guidance to support this legislation.)

Post mortem examination

3.46 Before post mortem examinations are performed on animals naturally or experimentally infected with a TSE agent, an assessment should be made of the necessity for the procedure.

3.47 The control hierarchy set out in COSHH (see COSHH ACoP and Guidance) requires that exposure be prevented in the first instance. The following points should be addressed when drawing up local codes of practice.

- a) The Containment Level of the post mortem area must be appropriate for the agent involved. Where it is not possible to use a dedicated room, an area of the post mortem room should be set aside.

- b) The procedure should be planned so that all equipment required is readily to hand and work should be organised so that there are no interruptions (e.g. to answer the telephone); only essential persons should be present in the post mortem room when carrying out procedures with infected animals.
- c) At least 2 persons should be present; in addition a circulator should attend (remaining uncontaminated) acting as an observer and co-ordinator, for example taking care of record-keeping, and handing over sterile/clean instruments etc.
- d) Consideration should be given to the subsequent disinfection of working surfaces, for example, work with small animals may be conducted in a stainless steel or plastic tray (enamel trays are not recommended) which should be washed clean before being autoclaved or disinfected with hypochlorite (20,000 ppm available chlorine) for 2 hours. Disposable coverings should protect other working surfaces.
- e) For large animal post mortems, consideration should be given to the means by which blood, body fluids and tissues that may be discarded during the post mortem examination will be collected and disposed of safely.
- f) Single-use disposable items should be used wherever practicable (alternatively a set(s) of dedicated instruments may be used) and appropriate protective clothing, including gloves, gowns, footwear, masks and visors or safety spectacles, should be worn. For large animal post mortems, heavy duty or waterproof clothing should be used. All items of reusable clothing should be rinsed clean in the post mortem suite before being autoclaved. For items that would not withstand repeated autoclaving such as rubberised boots, these should be washed clean then disinfected using hypochlorite (20000 ppm available chlorine). All disposable clothing should be autoclaved before being disposed of by incineration.
- g) Carcasses should be double bagged and placed in sealable bins prior to disposal by incineration. Small animal carcasses should be autoclaved prior to incineration.

Use of specified risk material in research

3.48 Those carrying out non-TSE research work should be aware certain animal tissues may be subject to The Specified Risk Material Regulations 1997 (as amended). If this is the case, material, e.g. bovine eyes, should preferably be sourced from animals that are destined for human consumption, i.e. not from cattle processed under the Over Thirty Months Scheme (OTMS), to reduce the risk of exposure to TSE agents. COSHH requires a minimum of CL2 in laboratories that do not intentionally work with biological agents but handle materials in respect of which there exist uncertainties about the presence of Hazard Group 2, 3 or 4 biological agents. Even if there is a negligible risk from BSE in such material, it may contain other zoonotic agents, hence CL2 would be appropriate.

References for Part 3 to be added to those already included in the appropriate reference section of guidance

Legislation:

The Environmental Protection Act 1990. c. 43

The Stationary Office. ISBN 0 1054 4390 5

The Specified Risk Material Regulations 1997 (as amended) SI1997/2965

The Stationary Office 1997. ISBN 0 11 65468 4

Guidance:

Advisory Committee on Genetic Modification's Compendium of Guidance.

Available at www.hse.gov.uk/hthdir/noframes/acgmcomp/acgmcomp.htm & HSE Books 2000 ISBN 0 7176 1763 7

HSC's Approved List of Biological Agents, also known as *Second supplement to "Categorisation of biological agents according to hazard and categories of containment"* (MISC 208)

Available at www.hse.gov.uk/hthdir/noframes/agent1.pdf & HSE Book 2000. ISBN 0717620344

Control of Substances Hazardous to Health (Fourth edition). The Control of Substances Hazardous to Health Regulations 2002. Approved Code of Practice and Guidance (L5) HSE Books 2002. ISBN 0 7176 2534 6 (A priced publication)

Working safely with research animals: Management of infection risks.

HSE Books 1997. ISBN 0 7176 1377 1 (A priced publication)

Information on Environmental Protection Act 1990 available at www.environment-agency.gov.uk/subjects/waste

ANNEX D

TRANSPORT OF TSE INFECTED MATERIAL

Introduction

D.1 All TSE infected specimens of human and animal origin are classed as infectious substances for the purposes of transport. The British (GB) Regulations covering the transport of infectious substances are outlined in Appendix 1 of this annex. Detailed guidance about the general requirements for transporting infectious substances is given in ACDP's revised guidance document '*Biological Agents: Managing the Risks*'.

D.2 The GB Regulations implement European Directives, which call up international agreements ADR (the European agreement concerning the international carriage of dangerous goods by road) and RID (Regulations concerning the international carriage of dangerous goods by rail). These give guidance on the classification, packaging, labelling and safe carriage of all classes of dangerous goods, including infectious substances, and are updated every two years. Division 6.2 - infectious substances - covers biological products, diagnostic specimens, genetically modified microorganisms (GMMs) and genetically modified organisms (GMOs), and clinical/biological waste. The standards are reviewed on a regular basis. A new set of domestic regulations that reflect the requirements of the 2003 texts of RID/ADR will come into force during 2003. These new texts will contain a new category for diagnostic specimens, called UN 3373. Substances assigned to this category can be packed in accordance with the new packing instruction P650 (see paragraph D.9 for further details). Although not yet in force in domestic regulations, a 'Certificate of Exemption' will soon be available to allow consignors to use UN 3373 and P650 in the interim period. The 'Certificate of Exemption' will be reproduced at Appendix 2 of this annex when available.

D.3 Regulations (see below) covering the transport of live animals infected with a TSE agent are the responsibility of the Home Office and DEFRA.

- The Animals Scientific Procedures Act 1986; and
- The Welfare of Animals (Transport) Order (WATO) 1997. (See the accompanying guidance "*A new guide on the welfare of livestock during transport*" and "Guidance on The Welfare of Animals (Transport) Order", which can be accessed from the DEFRA website.)

D.4 There are 4 steps involved in the safe transport of TSE infected material. These are:

- (i) Classification of the samples to be transported
- (ii) Packaging
- (iii) Labelling
- (iv) Transporting

Classification

D.5 The UN recommendations define infectious substances as:

“substances known or reasonably expected to contain pathogens that are known or reasonably expected to cause infectious disease in animals or humans”

D.6 Most TSEs are classified in the UK as a Hazard Group (HG) 3 agent for containment purposes, and most will also be classified as Risk Group 3 for transport purposes. Although scrapie has not been allocated to a hazard group, because there is no evidence to date of transmission of disease to humans, it is normally worked on in the laboratory at CL2. The majority of TSE samples (including scrapie) being transported are likely to meet the criteria for diagnostic specimens (see paragraph D. 7 below) and should therefore be carried according to the requirements of UN 3373 and packing instruction P650 regardless of whether they are HG 2 or 3. HG 2 and 3 samples not meeting the criteria for diagnostic specimens should be carried according to the full requirements of UN 2814/2900 (affecting humans and animals respectively) and packing instruction P620 (P602 for airfreight).

D.7 Diagnostic specimens are defined as any human or animal material including, but not limited to:

- excreta;
- secreta;
- blood or its components; and
- tissue fluids being carried for diagnostic or investigation purposes;

but excluding live infected animals, and are assigned to UN 3373. (Specimens are assigned to Risk Group 4 for transport if the source patient or animal has or may have a serious human or animal disease which can be readily transmitted from one individual to another, directly or indirectly, and for which effective treatment and preventive measures are not usually available.)

D.8 A TSE sample should be considered a diagnostic specimen, and assigned to Risk Group 3, on the following basis:

- the agent in the sample is not readily transmitted between individuals; and
- only a limited quantity of material is being transported for investigative purposes.

D.9 Hence, diagnostic specimens of TSE-infected material need meet only the requirements of UN 3373 and its packing instruction P650. P650 identifies all the consignment requirements for diagnostic specimens. The limited quantities defining diagnostic specimens are **500 g for solids** and **500 ml for liquids**. Providing the specimens meeting these limits are packed in accordance with packing instruction P650 no other requirements of RID/ADR apply. The P650 packing instruction is reproduced at Table 1 of this Annex.

D.10 All TSE material including brain/spinal cord tissue and body fluid samples such as CSF, blood, urine and faeces may be sent as diagnostic specimens under UN 3373 providing the amount in each primary receptacle does not exceed the 500 g/500 ml limit.

D.11 A number of specimens each individually not exceeding the 500g/500ml limit may be sent together in a single outer package providing the total amount does not exceed 4 kg (solids) or 4 l (liquids). It is permissible to have mixtures of samples within the same outer packaging providing each individual sample meets its specific requirements under P650.

D.12 Samples exceeding the limit of 500 g/ml are classified as Risk Group 4 for transport and must meet the full requirements of the regulations, which are summarised in Table 2 of this Annex.

Packaging

Table 1 - UN Packing Instruction P650 for diagnostic specimens

<p>General Provisions</p>	<p>Diagnostic specimens shall be packed in good quality packaging, which shall be strong enough to withstand the shocks and loadings normally encountered during transport, including trans-shipment between transport units and between transport units and warehouses as well as any removal from a pallet or overpack for subsequent manual or mechanical handling.</p> <p>Packaging shall be constructed and closed so as to prevent any loss of contents when prepared for transport, which might be caused under normal conditions of transport, by vibration or by changes in temperature, humidity or pressure.</p> <p>Primary receptacles shall be packed in secondary packaging in such a way that, under normal conditions of transport, they cannot break, be punctured or leak their contents into the secondary packaging. Secondary packaging shall be secured in outer packaging with suitable cushioning material. Any leakage of the contents shall not substantially impair the protective properties of the cushioning material or of the outer packaging.</p> <p>For transport each package shall be clearly and durably marked with the words 'DIAGNOSTIC SPECIMENS'. Packages containing substances carried in refrigerated liquid nitrogen shall, in addition, bear a label conforming to model no. 2.2.</p> <p>The completed package shall be capable of successfully passing the drop test in 6.3.2.5 as specified in 6.3.2.3 and 6.3.2.4 of ADR except that the height of the drop shall not be less than 1.2m.</p> <p>If any substances have leaked and been spilled in a vehicle or container, it may not be reused until after it has been thoroughly cleaned and, if necessary, disinfected or decontaminated. Any other goods and articles carried in the same vehicle or container shall be examined for possible decontamination.</p>
<p>For Liquids</p>	<ul style="list-style-type: none"> • Leakproof primary receptacle(s) containing no more than 500 ml. • Absorbent material placed between the primary receptacle and the secondary packaging; if several fragile primary receptacles are placed in a single secondary packaging, they shall be either individually wrapped or separated so as to prevent contact between them. • Sufficient quantity of absorbent material, such as cotton wool, shall be used to absorb the entire contents of the primary receptacles. • Leakproof secondary packaging. • Primary receptacle or secondary packaging should be capable of withstanding without leakage an internal pressure producing a pressure differential of not less than 95 kPa (0.95 bar). • Outer packaging shall not contain more than 4 litres.
<p>For Solids</p>	<ul style="list-style-type: none"> • Primary receptacle(s) shall be siftproof and contain no more than 500 g. • If several fragile primary receptacles are placed in a single secondary packaging, they shall be either individually wrapped or separated so as to prevent contact between them. • Leakproof secondary packaging. • Outer packaging shall not contain more than 4 kg.

Table 2 - UN Packing Instruction 620 for infectious substances affecting humans (UN No. 2814) and animals (UN No. 2900) classified as Risk Group 4 for transport

Type of material	Classification	Packing requirements (the same requirements are found in Packing Instruction 602 in the air regulations)
<p>Research specimens containing HG 2, 3 and 4 pathogens.</p> <p>Diagnostic specimens containing HG 4 pathogens; or HG 2 or 3 but exceeding the 500 g/ml limit.</p> <p>Genetically modified micro-organisms containing HG 2, 3 and 4 pathogens</p>	<p>Class 6.2</p> <p>UN 2814 (human)</p> <p>UN 2900 (animal)</p>	<ul style="list-style-type: none"> • A three layer packaging system comprising: <ul style="list-style-type: none"> (i) watertight primary receptacle, which directly contains the sample; (ii) watertight secondary packaging containing the primary receptacle; (iii) outer packaging of adequate strength for its capacity, mass and intended use, with a minimal external dimension of 100mm • Use absorbent material in sufficient quantity to absorb the entire contents and place between the primary receptacle and the secondary packaging: if several primary receptacles are placed in a single secondary packaging individually wrap them to prevent contact between them. • Use only type approved packaging materials <p>For lyophilized substances</p> <ul style="list-style-type: none"> • Flame-sealed glass ampoules or rubbered stoppered glass vials fitted with metal seals may be used for the primary receptacle. <p>For liquids and solids:</p> <ul style="list-style-type: none"> • For substances at ambient or higher temperature use primary receptacles of glass, metal or plastics. Use leakproof seals eg heat seal, skirted stopper or metal crimp seal. If screw caps are used then reinforce with adhesive tape. • For refrigerated or frozen substances place ice or dry ice around secondary packaging. Provide interior supports to secure secondary packaging in position after ice/dry ice has dissipated. For ice use waterproof outer packaging. For dry ice use outer packaging which allows release of carbon dioxide gas. For substances consigned in liquid nitrogen use plastic primary receptacles capable of withstanding very low temperatures. Secondary packaging must be capable of withstanding very low temperatures
<p>Infectious waste known or likely to be contaminated with HG 2, 3 or 4 pathogens.</p>	<p>Class 6.2</p> <p>UN 2814 (human)</p> <p>UN 2900 (animal)</p>	<ul style="list-style-type: none"> • Packaging that meet the requirements as listed above or the following. • Rigid packaging or intermediate bulk containers (IBCs), which are certified and marked as suitable for liquids. • Leakproof packaging or IBCs which are certified and marked as suitable for solids can be used if sufficient absorbent material to absorb the entire amount of liquid is present. • Packaging or IBCs which are used to contain ‘sharps’ must be resistant to puncture and able to retain fluids.

Labelling

D.13 TSE samples being sent as diagnostic specimens should be clearly marked with the words 'Diagnostic Specimen'. TSE specimens being transported as infectious substances should be marked as a UN approved package with the appropriate UN number and hazard diamond mark applied to the outside of the package. For frozen specimens being transported in an overpack, any certificated markings must be visible through the overpack or repeated on the overpack itself.

Transporting

D.14 Consignors should always discuss the transport requirements with their chosen carrier. In general, samples that are travelling as diagnostic specimens can normally be sent via the postal service. However, the Post Office does not accept specimens that contain HG3 or 4 agents. The consignor should check with the Post Office prior to sending any TSE samples and should follow any additional guidance given by the Post Office on packing and labelling requirements. TSE samples that are not being sent as diagnostic specimens will need to be transported by courier.

D.15 If transporting TSE specimens via a courier then the following information should be sent with the package:

- name, description and quantity of dangerous goods being sent;
- name, address and telephone number of shipper and consignee;
- type of packaging e.g. cardice/fibreboard box;
- handling information as appropriate; and
- name and telephone number of emergency contact person.

D.16 A dangerous goods document is not required for the transport of a TSE infected specimen going by road or rail within GB providing the primary receptacle does not exceed the 500 g/ml capacity. Specimens that are being sent on international journeys should be accompanied by the relevant international paperwork.

D.17 If TSE specimens are being sent by airfreight (either abroad or within the UK) then the company handling the transport arrangements must hold a dangerous goods licence. Most routine couriers will not have this. It is the sender's responsibility to comply with this requirement. The documentation required for transporting by air includes:

- (i) a shippers declaration form for dangerous goods (2 typed copies are required, experience suggests that an original signature is required on each) stating:
 - address and international telephone number of shipper and consignee;
 - nature and quantity of dangerous goods being sent;
 - how the tissue is packed i.e. cardice or fibreboard box; and
 - name and telephone number of emergency contact person.

- (ii) a Customs declaration sheet – this should be typed on headed note paper and include the following information:
- number and weight of samples;
 - type of sample (*e.g.* solid) and infectious substances affecting humans/animals for medical research only ;
 - value (nominal value for customs is £5 per box);
 - where samples are sent from (*e.g.* address on headed notepaper); and
 - 5 customs declaration sheets.

If an import permit is required for individual countries, this should be obtained prior to despatch.

- (iii) an emergency response sheet, which provides the information necessary in the event of an accident: See Infobox 1 for an example of an emergency response sheet.

InfoBox 1

Emergency response sheet for TSE-infected material

- Dangerous goods are infectious substance affecting human (*solid*) Class 6.2
UN number 2814
- No immediate hazard to health unless ingested or injected into the body
- No risk of fire or explosion
- In event of accident wear disposable gloves for handling the material
- For spillages wipe areas with 1M sodium hydroxide and leave for one hour before washing
- Dilute spillages with water before cleaning
- Dispose of waste by incineration

Training

D.18 All personnel involved in the transport of infectious substances and diagnostic specimens should be given relevant training.

Transport of animals

D.19 Although BSE and other HG 3 TSE agents are categorised in the higher risk groups by the transport regulations, exposure to agents in intact large animals, whether alive or dead can be considered to be remote.

Transport of livestock

D.20 Farm livestock, particularly adult cattle, but also sheep and pigs pose no significant risks from exposure to TSEs for the stockman, haulier or anyone else involved in livestock transport. There are however, considerable physical risks to these occupations due to the unpredictable behaviour of large animals especially when they are moved to unfamiliar surroundings. The animal welfare legislation (see para D.3) Welfare of Animals (Transport) Order (WATO) 1997 clearly impacts on this aspect.

D.21 Although the incidence of BSE in cattle in the national herd is rapidly diminishing, research with infected livestock is still ongoing. It is still foreseeable that infected livestock may need to be moved from time to time. If you need to transport clinical BSE cases then further guidance can be obtained from the Veterinary Laboratories Agency (see Appendix 3 for contact details). (Note: the VLA transport animals under a special license obtained under the Animals Scientific Procedures Act.) One exception to the remote risk of exposure to BSE when transporting cattle is where an animal has been orally dosed with BSE (or other TSEs) for experimental purposes. This procedure results in a risk of the agent being voided from the gut. Scientific evidence indicates that the risk period extends to a maximum of 2 weeks. Recently orally dosed livestock should not be transported. Where exceptional circumstances prevail advice should be sought from HSE (see Appendix 3 for contact details).

Transport of dead animals

D.22 Intact dead large animals do not pose a significant risk of transmitting disease to humans. The animal itself can be considered to be the primary containment. In this context, prion proteins will not be aerosolised, excreted, secreted or otherwise liberated from the central nervous system (CNS).

D.23 Animals that have been stunned before slaughter with a captive bolt will leak CSF fluid and possibly macerated neural tissue through the bolt hole. The hole should be stoppered with an appropriately designed plug and the head enclosed in two layers of robust plastic sacks tied off at the neck of the animal.

D.24 Only approved hauliers, who have the necessary competences, training and appreciation of the risks involved, should transport livestock and carcasses. The trucks should be leak proof and washed down with hot water and detergent (see ACDP's guidance booklet '*Bovine Spongiform Encephalopathy: Background and general occupational guidance*' for advice on basic precautions at work).

D.25 Bovine heads and whole brains should be doubled bagged and tied and placed in robust plastic boxes (e.g. 'Arca System' boxes) before being transported by courier.

D.26 Dead small animals and tissue samples from larger animals may be transported in full compliance with the postal and transport regulations by packing the samples in accordance with the UN packing note number 602.

Transport of small live animals

D.27 Small live animals such as mice infected with HG 3 TSE agents could pose a greater threat to humans because of the risk from exposure to bites and scratches. These animals should be contained in CL3 facilities, so to meet these measures while transporting them is difficult to achieve. There are unlikely to be many situations when infected small animals would need to be transported. However in cases where there is no alternative then advice should be sought from HSE (see contacts information in Appendix 3).

Advice on transporting infectious material

D.28 If any additional advice on transporting material infected with a TSE agent is required please contact HSE (see Appendix 3 for contact details).

Appendix 1**UK legislation covering the transport of infectious substances**

Legislation	Approved Documents
<ul style="list-style-type: none"> • The Carriage of Dangerous Goods (Classification, packaging and labelling) and Use of Transportable Pressure Receptacles (CDGCPL) Regulations 1996 • The Carriage of Dangerous Goods by Road Regulations 1996 • The Carriage of Dangerous Goods by Rail Regulations 1996 • The Carriage of Dangerous Goods by Road (Driver Training) Regulations 1996 • The Transport of Dangerous Goods (Safety Advisers) Regulations 1999 	<ul style="list-style-type: none"> • Approved requirements and test methods L88 1996 plus supplement (1999) • Approved vehicle requirements: Carriage of Dangerous Goods by Road Regulations 1996: Approved requirements L89 (1999) • The Approved Carriage List, L90 (1999)

Appendix 2

Certificate of Exemption

{This certificate is still being produced, but will be reproduced here once available.}

Appendix 3

Contact details:

Veterinary Laboratories Agency:

David Redwood
Safety Manager
VLA Addlestone
01932 357516

d.w.redwood@vla.defra.gsi.gov.uk

HSE – for advice on transporting dangerous goods:

Maureen Disson, SPD
HSE Rose Court
020 7717 XXXX

maureen.disson@hse.gsi.gov.uk

References for Annex D – to add to section of guidance detailing all references

Legislation:

The Animals (Scientific Procedures) Act 1986
The Stationary Office 1986. ISBN 0110394356

The Welfare of Animals (Transport) Order (WATO) 1997. SI 1997/1480
ISBN 011063764X

Guidance:

A new guide on the welfare of livestock during transport. Available at the DEFRA website –
www.defra.gov.uk/animalh/welfare/farmed/transport/wato-leaflet

Guidance on Welfare of Animals (Transport) Order (WATO) 1997. Welfare of Animals
(Transport) Order (WATO) 1997. Available at
www.defra.gov.uk/animalh/welfare/farmed/transport/wato-guidance