Translation

Contents

Preface

Purpose

The purpose of this Danish Environmental Protection Agency ("Danish EPA") guideline on the management of Health-care risk waste, which is a revision of Guideline No. 1/1984, on the disposal of hospital waste, is to support local councils, waste generators, carriers and waste treatment plants when upgrading or establishing disposal systems for *Health-care risk waste.*

Area of application

During revision, it was deemed appropriate to expand the scope of the guideline to include the management of Health-care risk waste in the primary and secondary Health-care sectors.

In this context, "management" denotes reporting, declaration, packing, labelling, storage, collection and transporting, as well as the disposal/incineration of the waste.

Health-care risk waste

To indicate that waste from other sources is also covered, the expanded field of application of this guideline has made it necessary to find a new designation for waste that requires special management. The designation *"special hospital waste"* has therefore been replaced by the designation *"Health-care risk waste"*.

Contents

The guideline discusses the following main topics:

- Waste generators and waste types;
- Infection risk and the definition thereof;
- Planning of management systems for Health-care risk waste;
- Collection, packing and storage of Health-care risk waste;
- Transporting of Health-care risk waste;
- Treatment of Health-care risk waste;
- Checklists for setting up and evaluating schemes for Health-care risk waste.

Special types of waste

The guideline deals with the following types of special waste associated with Health-care risk waste:

- Radioactive waste;
- Waste from experimental animals;
- Residues of pharmaceuticals and hypodermic needles used on livestock or pets.

Steering committee

The drafting of this guideline was followed by a steering committee, which included representatives from the National Board of Health, the Directorate of Labour Inspection, the National Serum Institute, the Department of Medical Officers of Health in the Storstrøm local-council area, the Danish Society of Infection Control Nurses, Copenhagen University Hospital, the General Workers' Union in

Denmark, Marius Pedersen A/S, the National Association of Local Authorities In Denmark and the Municipality of Copenhagen. Rambøll has acted as a consultant to the steering committee.

Summary

Objective etc.

This Danish EPA guideline on the disposal of Health-care risk waste replaces Guideline No. 1/1984 on the disposal of hospital waste, and is intended to assist local councils, waste generators, carriers and waste treatment plants in upgrading and establishing disposal systems for Health-care risk waste.

The background of the revised guideline is the substantially changed circumstances of waste disposal in connection with the harmonisation of national legislation with EU directives, the implementation of stricter regulation of packing, transportation, etc., pursuant to the ADR Convention, as well as amended directions for the treatment of Health-care risk waste by incineration.

In connection with the revision, it was deemed appropriate extend the guideline to include the disposal of Health-care risk waste in the primary and the secondary Health-care sectors. With a few amendments, the directions of Guideline No. 10/1989, on the disposal of special hospital waste issued by the National Board of Health to personnel in the primary Health service, have been incorporated into this guideline.

Health-care risk waste and tissue waste

Broadening of the guideline beyond the hospital sector has made it relevant to find a new term for *special hospital waste*, to indicate that waste generated by sources other than hospitals is also covered by the amended guideline. As of this guideline, the term *"special hospital waste"* is therefore replaced by the terms *"Health-care risk waste"* and *"tissue waste"*.

Principles of waste management

The Danish Environmental Protection Agency considers sanitarily sound management of Health-care risk waste to include all stages, from generation to final disposal (treatment) of the waste. Consequently, it is important that waste-management planning be based on the following principles:

- Source separation at the place where the waste is generated;
- Minimum contact with the waste;
- Packing of the waste where it is generated;
- Minimum repackaging of packed waste;
- Sound, sanitary storage;
- Transportation in approved packaging;
- Automatic handling during feeding at treatment plants;
- Treatment by incineration or other treatment, which documents the deactivation of pathogenic microorganisms to such an extent that, the waste is no longer infectious.

Risk of infection

When handling waste from the Health-care sector, microorganisms conveyed by the blood, such as HIV and the hepatitis B virus (HBV), have given particular cause for concern. These viruses are primarily transferred through the skin, often in connection with blood-contaminated, sharp objects, such as needles and bone fragments, to the personnel who handle waste. The most significant risk occurs during the actual generation (production) of waste.

Apart from infection through the skin, no cases of infection by microorganisms have been reported in connection with the management of waste from the Health-care sector. *Given the combination of careful source separation of sharp and bloody waste with the use of safe and unbreakable packaging, the risk of infection by micro-organisms carried by blood must be considered negligible in all phases of waste management.*

Definition of Health-care risk waste

Health-care risk waste includes waste from hospitals, maternity homes, treatment centres, home-care schemes, medical practices, dental clinics, midwifery, etc., which in the event of *direct contact* may involve a certain risk during handling:

- Cutting and pricking objects used in the care or treatment of patients;
- Other infectious waste, possibly containing microorganisms from diagnostic testing, from the treatment of patients and from experimental animals.

For some types of Health-care risk waste, such as tissue and body parts, recognition of the waste after treatment is undesirable. In treatment by incineration, large coherent tissue and body parts must, consequently, be treated separately to ensure complete burnout. Such waste is called *"tissue waste"* in this guideline. Tissue waste can be defined as all recognisable tissue and body parts, as well as other waste destined to be treated beyond recognition for aesthetic reasons. As a rule, tissue waste is not generally considered to be risk waste.

Legislative basis

The legislative basis for regulation of the management of Health-care risk waste is extensive, and it is characteristic that it is not only regulated in relation to protection of the external environment, but also through legislation on Health and safety at work. The legislative basis includes:

- The Environmental Protection Act, which stipulates that any person generating, storing, treating or disposing of waste shall ensure that non-sanitary conditions or the pollution of air, water or soil do not occur;
- Ministry of Environment and Energy Statutory Order No. 299, on waste, which states the general provisions for the management, planning and registration of waste, including

hazardous waste, to which category Health-care risk waste belongs. The statutory order directs local authorities to establish collection schemes for hazardous waste;

- The Health and Safety at Work Act, which stipulates that work shall be planned, organised and carried out in such a way that it is completely safe in terms of Health and safety;
- Statutory orders etc., of relevance to the planning of work with Health-care risk waste, issued by the Ministry of Labour and the Danish Working Environment Service pursuant to the Health and Safety at Work Act. The most essential legislation concerns the performance of work, the application of technical aids, the design of technical aids, micro-organisms and the working environment, as well as AIDS and preventive measures against HIV infection;
- The Practice of Medicine Act and the Nurse Act, which stipulates that medical personnel etc., shall exercise care and conscientiousness in their work;

Guideline

Apart from the above, the following guideline should be mentioned:

- The National Board of Health guideline on HIV and the prevention of infections conveyed by the blood, which recommends precautions relevant to the handling of patient material and measures designed to limit pricking and cutting accidents effectively.

ADR

Regulation of the classification, packing, marking and road transportation of hazardous substances pursuant to the international ADR Agreement has been reinforced in terms of the packaging and transportation of Health-care risk waste. Ministry of Traffic Statutory Order No. 762 implements the ADR for transportation on Danish national roads, on the transportation by road of dangerous goods.

Collection, packing and storage

The following requirements shall be observed when collecting, packing and storing waste:

- Waste from the Health-care sector shall be separated at the site of generation;
- The collection and internal transportation of Health-care risk waste shall be planned so as to minimise contact with the patient and treatment sectors and to restrict public access to the waste;
- In all parts of the system, waste shall be collected at regular and appropriate intervals in order to avoid environmental nuisances and any unnecessarily extensive storage of waste;
- Packaging used as transport packaging shall be of an approved type. When purchasing packaging in general, careful consideration must be given to its function and to testing;
- The internal handling of Health-care risk waste shall be planned so as to minimise manual lifting;

- Filled packaging shall be sealed and labelled before leaving the place where it was generated;
- Health-care risk waste shall be kept in an appropriate storage facility;
- Health-care risk waste shall be properly packed;
- Returnable packaging for the collection and transportation of Health-care risk waste shall be kept clean;
- Health-care risk waste shall not be mixed with other waste without the prior approval of the local authorities.

Transportation

The following requirements must be observed, when transporting waste:

- In the case of external transport, the packaging and transportation shall comply with the provisions of the ADR;
- The handling of packaging in connection with transportation shall be planned so as to avoid manual lifting;
- Vehicles etc., used for transporting Health-care risk waste shall be kept clean;
- Health-care risk waste must not be mixed with other waste;
- Packaging which is damaged during transportation shall be repacked, preferably in new, larger packaging to avoid opening of the damaged packaging.

Treatment

The following requirements shall be observed when treating Health-care risk waste:

- Health-care risk waste, which has not been deactivated, shall be disposed of by incineration;
- Health-care risk waste shall be incinerated at plants specially designed and approved for the treatment of Health-care waste;
- With a few exceptions, deactivated Health-care risk waste can be disposed of as waste similar to domestic waste ("domestic-type waste") and other wastes;
- The handling of Health-care risk waste shall be planned so as to minimise manual lifting.

Apart from careful operation, maintenance and cleaning, sanitary conditions and a good working environment at incinerator plants can only be ensured if Health-care risk waste is handled separately from other waste types, and if Health-care risk waste is handled according to special operational regulations, with the maximum application of automation and technical aids, to minimise physical contact with the waste.

Separate and individual feeding of packaging containing Health-care risk waste directly into the combustion zone is often preferred at incinerator plants where Health-care risk waste is treated with other waste (e.g., separate feeding through the lateral wall of the furnace at

incinerator plants treating domestic waste and similar waste), as direct feeding minimises the presence of Health-care risk waste inside the plant during unintentional shutdown. At certain types of incinerator plant, separate and direct feeding can, however, be difficult to integrate into the furnace/boiler concept, and the extra opening can affect control of the plant and, thus, the operation of the entire plant. Co-feeding of Health-care risk waste with other waste (e.g., in the form of hopper feeding) could be considered in such cases.

This guideline thus gives the option of feeding directly to the combustion zone (e.g., separate feeding) as well as co-feeding (e.g., hopper feeding). Co-feeding requires that the packaging used be suitable for co-treatment and that it should not open prior to incineration, that the feeding operations be monitored and controlled, that grate riddling be collected separately and automatically and incinerated, and, finally, that special precautions be taken if manual operations involve any risk of contact with Health-care risk waste.

Checklist

Chapters 8 and 9 of the guideline present checklists for evaluating the current and new schemes established by the local authorities and the waste generators, respectively, for Health-care risk waste.

Model for waste sorting

Annex B of this guideline presents a three-level model for waste sorting:

- General directions;
- General guideline for the sorting of waste;
- Overview of waste schemes.

1 Introduction

Background

This guideline from the Danish EPA is a revision of Guideline No. 1/1984, on the disposal of hospital waste, which it now replaces. The reason for the revision is a number of amendments, for instance, to the constitution, since the earlier guideline was published.

- A number of EU Directives have been adopted, which involve the harmonisation of legislation in the field of waste. This was, for instance, so in the case of EU Directive No. 91/156/EEC, on waste /1/, EU Directive No. 91/689/EEC, on hazardous waste /2/ and EU Directive No 94/67/EU, on the incineration of hazardous waste /3/.
- The Danish rules governing management, planning and registration are, thus, amended, cf. Danish EPA Statutory Order No. 299, of 30 April 1997, on waste /4/. The Statutory Order covers, for instance, *waste from doctors' or veterinarians' clinics and/or from research activities associated therewith.*
- The implementation of regulations in pursuance of the European agreement on the international transportation of hazardous goods on highways (the ADR Convention /5/) entails stricter requirements on packaging, when transporting the waste covered by the guideline.
- Finally, Chapter 5 of the earlier guideline on the incineration of hospital waste has been replaced by Danish EPA Guideline No. 2/1993, on the limitation of pollution emitted by waste incinerator plants /6/. Part II of Guideline No. 2/1993 covers the incineration of special hospital waste and states technical requirements on the establishment of incinerator plants for special hospital waste, their combustion processes, emissions, etc. This guideline contains supplementary recommendations on the reception, storage and feeding conditions, etc., of incinerator plants, although for the specific technical requirements on incineration the reader is referred to Guideline No. 2/1993 /6/ and amendments, which applies as a consequence of the revised statutory order on incinerator plants /41/.

During revision, it was deemed appropriate to expand the scope of the guideline to include the management of Health-care risk waste from the primary and secondary Health-care sectors. With a few amendments, the directions of Guideline No. 10/1989, on the disposal of special hospital waste issued by the National Board of Health to personnel within the primary Health service, have been incorporated into this guideline and the National Board of Health guideline is hereby revoked.

1.1 Target groups

This guideline is primarily aimed at planners in the Health-care sector and at the local and regional levels, etc., (including advisers to these groups), who bear the responsibility for the design and operation of systems for managing waste from the Health-care sector.

This guideline is also intended for administrators and employees in the Health-care sector, who are involved in purchasing, environmental management and production, and for the planners and employees of the waste carriers and waste treatment plants, who are involved in handling the waste.

1.2 New definition

Health-care risk waste

The expansion of the field of application of this guideline beyond hospitals has made it necessary to find a new designation for *special hospital waste*, as it is necessary to indicate that waste from other sources is also covered by the revised guideline. As of this guideline, the designation *"special hospital waste"* has therefore been replaced by the designation *"Health-care risk waste"*.

As defined in this guideline, Health-care risk waste is covered by the definition of *hazardous waste,* cf. Danish EPA Statutory Order No. 299, on waste /4/.

The prime reason for separating Health-care risk waste from hazardous waste is the need for special handling of this type of waste.

1.3 Contents

This guideline does not change the main principles of the earlier guideline, i.e., that the handling of Health-care risk waste must be carried out without any risk of spreading infection or of polluting the surroundings and the necessity of securing a working environment, which is non-hazardous from the standpoints of safety and Health.

Principles of waste management

The Danish EPA remains of the opinion that the sanitary management of Health-care risk waste includes all stages, from the generation of waste, to its final disposal (treatment). It is, thus, important that waste management planning be based on the following principles:

- Source separation at the place where the waste is generated;
- Minimum direct contact with the waste;
- The greatest possible use of technical aids;
- Packing of the waste where it is generated;

- Minimum repackaging of packed waste;
- Sound and sanitary storage;
- Transportation in approved packaging;
- Automatic handling during feeding at treatment plants;
- Treatment by incineration or other treatment that documents the deactivation of pathogenic microorganisms to such an extent that the waste is no longer infectious.

In recent years, the Health-care sector's working routines pertaining to waste handling have been changed due, e.g., to the risk of infection by HIV/AIDS. This revised guideline defines the infection risks inherent in waste from the Health-care sector in general, since the infection risks of waste form the point of departure for the definition of waste and for the guideline's recommendations on management of the waste.

General directions for the planning of management systems are a new addition to the guideline. Furthermore, this guideline elaborates on the options available for the sanitary collection, packing, storage, transportation and disposal of Health-care risk waste, in comparison to the earlier guideline.

Checklists for municipal and local management schemes can be found at the end of this guideline.

1.4 Legislative basis

The foundation of the rules governing the management of waste from the Health-care sector is partly the direct legislation, which regulates this field directly or which has a significant regulatory effect thereon, and partly a number of guidelines and provisions, which support the direct legislation with detailed instructions, but which are not necessarily binding.

The wording of the act enables local councils to issue Provisional Orders and to stipulate rules for waste recipients, which specify local rules for waste management.

The individual topics of this guideline include references to the relevant acts, statutory orders and provisions listed in Annex E.

The most important legislative basis of the management of waste from the Health-care sector includes:

- The Environmental Protection Act /7/, which states that everyone who generates, stores, treats or disposes of waste is responsible for ensuring that unsanitary conditions do not occur and that there is no pollution of air, water or soil. This act empowers the Danish EPA to set rules on waste management,

including on the reporting, sorting, storing, collecting, transporting, treating and processing of waste;

- Ministry of Environment and Energy Statutory Order No. 299, on waste /4/, contains the detailed provisions for the management, planning and registration of waste in general, also including guidelines for drafting Provisional Orders and for registering carriers etc. This statutory order confirms the duty of local councils to ensure the safe management of *all* waste generated within their areas, as well as their duty to draft Provisional Orders on all waste. Moreover, the statutory order directs local councils to establish collection schemes for hazardous waste from enterprises (i.e., including Health-care risk waste);
- The Environmental Act /8/, pursuant to which work shall be planned, organised and carried out in a manner completely sound from the standpoints of Health and safety. Pursuant to the Environmental Act, the Ministry of Labour and the Directorate of Labour Inspection have issued a number of statutory orders of relevance to work with Health-care risk waste. The most important of these govern the performance of work /9/, the use of technical aids /10/, the design of technical aids /11/, as well as biological agents and the working environment /12/;
- Directorate of Labour Inspection Instruction No. 4.9.1.1, on AIDS and the prevention of HIV infection /13/, states that waste which contains blood, biological tissue or tissue fluids from humans should be managed, stored and disposed of in such a way that employees avoid contact through the skin or mucous membranes with the waste;
- The Practice of Medicine Act /14/ and the Nurse Act /15/ (together with corresponding acts for other authorised Health personnel, including dentists, physiotherapists, chiropractors, *et al.*), pursuant to which medical personnel, etc., shall exercise care and conscientiousness in their work. Further, the National Board of Health guideline on the human immune-deficiency virus (HIV) and the prevention of infection conveyed by the blood /16/ states the precautions to observe when handling patient material and for the effective limitation of pricking and cutting accidents.

1.5 Organisation of the guideline

The guideline starts with a description of the waste sources and waste types that are within its scope (see Chapter 2), as well as a description of infection risks and a definition of waste from the Health-care sector (Chapter 3).

Chapter 4 reviews the requirements and options for the planning of management systems for Health-care risk waste. Chapters 5, 6 and 7

review the requirements and options for the collection, packing and storage (Chapter 5), transportation (Chapter 6) and disposal (Chapter 7) of such waste.

Chapters 8 and 9 contain checklists for use when organising municipal and local management schemes.

2 Waste generators and waste types

2.1 Waste generators

This guideline covers all waste generators in the primary and secondary Health-care sectors.

The primary Health-care sector

The primary Health-care sector includes small and medium-sized waste generators, such as practising doctors, dentists and midwives, home-care schemes and nursing homes.

The secondary Health-care sector

The secondary Health-care sector includes large and medium-sized waste generators, such as hospitals and infirmaries, clinics and laboratories, treatment institutions and sanatoriums.

Typical waste generators are listed in Annex A.

Special types of waste

This guideline also contains information on the rules governing the following special types of waste, which are associated with Health-care risk waste and the generators thereof (cf. Section 3.3):

- Radioactive waste;
- Waste from experimental animals;
- Residues of pharmaceuticals and hypodermic needles used on livestock or pets.

2.2 Types of waste

Waste generated in the primary and secondary Health-care sectors can be divided into four main categories:

Health-care risk waste

1) *Health-care risk waste,* which entails a risk of the transmission of infection.

Tissues waste

2) *Tissue waste,* when there is a desire for non-recognition after treatment.

Other hazardous waste

3) *Hazardous waste other than* Health-care risk waste, i.e., waste that is one or more of the following:

- Explosive
- Oxidising
- Flammable
- Toxic
- Harmful
- Corrosive
- Local irritant
- Sensitising
- Carcinogenic
- Mutagenic
- Toxic to reproduction
- Dangerous to the environment.

Waste similar to domestic waste and other waste

4) *Waste similar to domestic waste ("domestic-type waste")* and *other waste,* the composition of which is similar to ordinary waste from households and offices, which can be integrated into ordinary waste management systems in pursuance of municipal regulations (as far as definitions are concerned, this category can include several types of waste, cf. the relevant definitions in municipal regulations).

The detailed definition of Health-care risk waste is given in Section 3.2 of this guideline. To clarify the boundary between Health-care risk waste and domestic-type waste and other waste, Section 3.2 gives examples of waste fractions that can be managed as domestic-type waste.

3 Infection risk and its definition

3.1 Infection risk

Transmission of infection

In principle, there are four ways in which infection by micro-organisms (bacteria, viruses, fungi and parasites) can be transmitted when handling waste:

- Through the skin, either through damaged skin or by penetration (by needle pricks or sharp objects);
- Through the surfaces of mucous membranes, by splashing;
- Through the respiratory passages, by inhalation;
- Through the gastrointestinal canal, by the ingestion of infectious material.

When handling waste from the Health-care sector, microorganisms conveyed by the blood, such as HIV and the hepatitis B virus (HBV), have given particular cause for concern. These viruses are primarily transferred through the skin (often in connection with blood-contaminated sharp objects, such as needles and bone fragments), to personnel who handle waste. The most significant risk occurs during the actual generation (production) of waste.

Apart from infection through the skin, no cases of infection by microorganisms have been reported in connection with the management of waste from the Health-care sector /17/, /18/ and /19/. *Given the combination of careful separation at source of sharp and bloody waste with the use of safe and unbreakable packaging, the risk of infection by micro-organisms carried by blood must be considered negligible during all phases of waste management.*

The transmission of infection by other microorganisms, such as staphylococci and the tubercle bacillus, is mainly linked to primary contact with patients and can be prevented by ordinary measures of hygiene.

3.2 Definition

Health-care risk waste

Health-care risk waste includes waste from hospitals, maternity homes, treatment institutions, home-care schemes, practising doctors, dentists and midwives, etc., (see Annex A), which *by direct contact* can entail a special risk in handling;

- Sharp and pricking objects, which have been used in patient care or treatment, such as:

  - Hypodermic needles, knives, guide wires, scissors, tweezers, suture needles, drip chambers and suchlike, which can penetrate skin;
  - Test tubes, glass shards, etc., which contain blood, pus or residues of tissue fluids;
  - Laboratory glassware (e.g., haemoglobin cuvette, capillary tubes, pipettes and glass shards) contaminated with blood, pus or residues of tissue fluids;

- All waste from isolation patients, unless knowledge of the infection route means that the risk involved in handling the waste is minimal, cf. /40/. Out of consideration for the risk of infecting other patients or for the practical maintenance of isolation regimes, it is possible to elect to manage a greater portion as risk waste than actually corresponds to the true management risk. When drafting directions, the local hygiene committee can be involved in specific cases.

Examples of Health-care risk waste in this category are:

- Waste from cholera patients;
- Waste from anthrax patients.

Waste from meningitis patients, from TB patients and napkins from diarrhoea patients where the moisture is absorbed (excluding cholera) are examples of domestic-type waste from this patient category (unless the waste fits into either of the other two main categories).

· Other infectious waste, which contains or can contain microorganisms from the diagnosis or treatment of patients, as well as from experimental animals, e.g.:

- Petri dishes etc., which contain live bacterial, viral or fungal cultures;
- Urinals etc., which contain blood, pus or tissue fluids, which cannot be emptied prior to disposal and which have not been effectively deactivated;
- Very wet disposable materials (which drip when squeezed), where the liquid consists of tissue fluids, pus or blood from patients, such as bandages, surgical drapes, operation napkins, napkins or sanitary towels;
- All tissue from experimental animals, which contains micro-organisms pathogenic to humans;
- Residues of live vaccine;
- Certain types of tissue waste, which due to pricking (e.g. bone splinters) or moist/dripping properties (e.g. placenta) can constitute a risk; see the section on tissue waste.

It should be noted that Health-care risk waste is defined as dangerous waste, cf. Annexes 3 and 4 of Ministry of Environment and Energy Statutory Order No. 299, on waste /4/. Health-care risk waste, which has been treated with documented deactivation of pathogenic micro-organisms to such an extent that the waste no longer carries any infection and which has also been deformed so that it is no longer sharp/pricking, is not considered to be dangerous waste after deactivation and deformation and can be disposed of as domestic-type waste.

Tissue waste

For certain types of tissue and body part, it is desirable to secure non-recognition of the waste after treatment. When treating by incineration, large, coherent tissue and body parts must be specially treated to ensure complete incineration; cf. Section 7.2. This waste, which is called "biological waste", or "pathological waste" in some contexts, is designated *"tissue waste"* in this guideline. Tissue waste can henceforth be defined as all recognisable tissue and body parts, as

well as other waste where non-recognition after treatment is considered appropriate for aesthetic reasons, or where pricking/moist characteristics of the tissue constitute a potential hazard in disposal. Typical tissue waste includes, e.g.:

- Placentas;
- Aborted foetuses;
- Tissue samples, including samples preserved in formalin;
- Amputated body parts.

Tissue waste should only be considered as risk waste/hazardous waste if it belongs to one or more of the three main Health-care risk waste categories mentioned above, e.g., due to its content of blood or other fluids (e.g., placentas or tumours removed from the abdominal cavity) or because of its pricking/sharp characteristics (e.g., pieces of bone). Unless it is certain that tissue waste does not contain parts that constitute Health-care risk waste, it is recommended that tissue waste be generally handled as Health-care risk waste.

Tissue waste shall be packed separately from other clinical waste and incineration must be carried out in a furnace that guarantees complete incineration.

On the other hand, residues of the gums, warts and resection residues from wounds, etc., can normally be disposed of as domestic-type waste.

Hazardous waste other than Health-care risk waste

Concerning the definition of hazardous waste in general, see Danish EPA Statutory Order No. 299, on waste /4/. Other hazardous waste generated within the Health-care sector includes, e.g., laboratory waste, and residues of mercury, pharmaceuticals and photographic chemicals.

Chemotherapy medicine residue

Chemotherapy medicine residue is medicinal waste and is classified as "other hazardous waste" according to the definition in this guideline. Chemotherapy medicine residue, i.e., residues, spillage, etc., shall therefore be handled as *other hazardous waste.* Empty vials, gloves and suchlike, which can be contaminated with Chemotherapy medicine residues, will only rarely merit consideration as hazardous waste, although it is still recommended that they be disposed of as health-care risk waste, cf. the Directorate of Labour Inspection's instruction on working with Chemotherapy medicine residues /20/.

In practice, waste will be encountered that contains blood, pus or tissue fluids *and* chemotherapy medicine residues. Such waste must *either* be handled as health-care risk waste because of its content of blood, pus or tissue fluids *or* as other hazardous waste because of explicit contamination with Chemotherapy medicine residues, all according to the assessment of the responsible specialist health personnel.

This procedure can mean a change in present sorting practice, in which waste contaminated with Chemotherapy medicine residues is handled together with health-care risk waste (cf. the Directorate of Labour Inspection's instruction on work with Chemotherapy medicine residues /20/). According to the information available to the Danish EPA, this practice has not caused any special problems, but its continuation would require local councils either to grant exemption from the prohibition on mixing hazardous waste types or to incorporate the practice into a regulation; see ref. /4/, Paragraph 59. In this context, it is well to note that such exemption requires that the incinerator plant be approved for the treatment of hazardous waste other than health-care risk waste. The Danish EPA considers that, if the instructions of this guideline are otherwise followed, minor quantities of surgical drapes, napkins and suchlike containing chemotherapy medicine residues mixed with the health-care risk waste do not mean that an incinerator plant needs approval for the treatment of hazardous waste other than health-care risk waste. However, the incineration or destruction of discarded chemotherapy medicine residues by other means should only be done at plants that are approved for the disposal of hazardous chemical waste, such as Chemotherapy medicine residues, etc.

The precautions to be observed by personnel and other persons in conjunction with the generation of Chemotherapy medicine residue are stated in the Directorate of Labour Inspection's rules including, e.g., instructions for working with Chemotherapy medicine residues at hospitals and nursing homes /20/.

Domestic-type wastes and other waste

In this guideline, domestic-type waste and other waste includes all health-sector waste that is not classified as health-care risk waste, other hazardous waste or tissue waste. Thus, domestic-type waste and other waste cover ordinary waste from in-patient wards and other patient care, other waste, office waste, kitchen waste, bulky waste, garden waste, building waste, etc. The composition of such waste corresponds to ordinary types of waste from households, institutions and offices and can be integrated into ordinary management schemes in compliance with municipal regulations.

Because of the definition of health-care risk waste, examples of health-sector waste that can normally be handled as domestic-type waste are given below:

- Drip equipment;
- Ostomy bags;
- Napkins;
- Empty urine bags;
- Bandages, disposable surgical drapes, operation napkins, napkins, sanitary towels and suchlike, into which blood, pus or tissue fluids are absorbed.

In the case of dentists: cotton rolls, gauze pads, napkins and disposable cups.

For reasons of hygiene when storing and collecting waste, it is recommended that waste packages containing these articles be sealed by the waste generator, e.g., in closed plastic bags, prior to handling as domestic-type waste.

Other pricking/cutting waste

The other waste generated, e.g., by hospitals or clinics, can include pricking and cutting objects, which have not been in contact with blood or pathogenic micro-organisms from humans or animals and therefore do not constitute health-care risk waste, cf. Section 3.2 Definition. Such objects can constitute a risk if they become contaminated with other waste and then prick or cut their way through waste sacks, to cause lesions to persons handling the waste.

It is therefore recommended that local guidelines be drafted, according to which non-infectious pricking and cutting objects (such as shards of glass or nails) be collected separately (scrap-glass buckets) and destroyed in such a way that they are not manually handled together with ordinary waste. Flower stalks can be packed, e.g., in newspaper.

On the other hand, the remains of old hypodermic needles and suchlike (which are discarded, e.g., because they are outdated) shall be disposed of as health-care risk waste, partly so that they do not cause unnecessary concern in subsequent phases of waste management by suddenly appearing in the domestic-type waste from hospitals.

3.3 Special types of waste, etc.

Certain special types of waste are closely linked to health-care risk waste.

Radioactive waste

The management of radioactive waste is regulated by the National Board of Health's statutory order on the use of open radioactive sources in hospitals, laboratories, etc., /21/, the National Board of Health's statutory order on radiation protection when working with open radioactive sources /22/, the Risø National Laboratory's rules for taking over radioactive waste /23/ and the National Board of Health's statutory order on the transportation of radioactive substances /24/.

The guidelines section of the National Board of Health's statutory order on the use of open radioactive sources in hospitals, laboratories, etc., /21/, states that radioactive waste consists of many different products, in many physical and chemical forms containing very different concentrations. To facilitate subsequent treatment, it is therefore necessary to sort such waste at the place where it is generated.

It is stated that the classical methods of disposing of radioactive waste have either been "dilution and dispersal" or "concentration and encapsulation"; see ref. /21/, Section 10.5. The statutory order also states that dilution and dispersal is tempting as it resolves the acute local problem, whereas concentration and encapsulation cause difficulties in storage and monitoring. The statutory order stipulates that the treatment and management of radioactive waste shall be implemented in such a way that the radiation dose received by persons exposed in the course of their work, and by the population as a whole, be kept at an acceptable level in pursuance of the National Board of Health's dose limits; see ref. /21/, Section 10.5.

Radioactive waste is classified into the following groups (see ref. /21/, Section 10.5):

- Solid waste, which can be classified as inactive.
  This can be disposed of as ordinary waste, provided that the radioactivity does not exceed 0.1 MBq/kg waste;
- Waste that can be disposed of directly by incineration (solid waste) or by discharge into drains (liquid waste).
  In the case of solid waste, the dose rate must at no point on the packaging exceed 5 µSV/hour and the radioactivity in each package must not exceed 5 MBq, for radio-nuclide group 2, 50 MBq, for radio-nuclide group 3 and 500 MBq, for radio-nuclide group 4. Waste containing radio-nuclide group 1 must always be handled in accordance with the next point. In the case of liquid waste, corresponding monthly activity quantities for the radionuclide groups apply to the laboratory drains. Before a radioactive liquid is poured into a drain, it shall be diluted down to a concentration of less than 0.1 MBq/litre.
- Waste for which treatment is required. Treatment can consist of decay, processing at Risø, returning to sender or incineration/discharge pursuant to rules stipulated by the National Board of Health in each individual case. See the above-mentioned statutory order /21/, when selecting the method of treatment.

The National Institute of Radiation Hygiene, under the National Board of Health, administers the rules governing radioactive waste. In this context, it should be mentioned that permission for the purchasing and use of open radioactive sources must be obtained from the National Board of Health; see ref. /21/, Paragraph 2, Item 2.1.

Waste from experimental animals

Veterinary Department Statutory Order No. 612, of 17 July 1995, on the pre-processing of animal waste and on the production of animal feed with animal content /25/, stipulates animal-health provisions on the pre-processing of animal waste, under which waste from experimental animals is regulated.

The statutory order contains the following definitions (see ref. /25/, Paragraph 2):

- Animal waste: animal cadavers or parts of animals, or products of animal original not destined for human foodstuffs;
- High-risk substances: animal waste that can be linked to serious risks to the health of animals or humans;
- Low-risk substances: animal waste that is not linked to serious risks to the health of animals or humans.

The statutory order stipulates that high-risk substances can only be pre-processed at rendering plants approved by the Veterinary Department; see ref. /25/, Paragraph 3, Item 1. Exceptions to this include material which is sent, e.g., to incinerator plants, and material which is sent to a diagnostic laboratory for examination; see ref. /25/, Paragraph 6.

Low-risk substances can be used for animal feed and technical products or can be disposed of by incineration or burial; see ref. /25/, Paragraph 8.

The Danish EPA recommends that infection-bearing waste from experimental animals, which is not disposed of by a rendering plant approved by the Veterinary Department, be handled as health-care risk waste according to the directions of this guideline.

Residues of medicines and hypodermic needles used on livestock or pets

Veterinary Department Statutory Order No. 303, of 11 May 1995, on medicines for veterinary use /26/, stipulates provisions for the administration of medicines to animals.

Pursuant to the statutory order, the Veterinary Directorate has promulgated a guideline /27/ which stipulates that, after expiry of the treatment period, residues of supplied or prescribed medicines shall be handled in accordance with the rules applying at the time, e.g., municipal schemes for the management of hazardous waste from private households, or shall be returned to the pharmacy that sold the medicines.

The Danish EPA recommends ensuring the establishment of a municipal scheme for the collection of residues of medicines used on livestock or pets. Similarly, it recommends ensuring the establishment of a municipal scheme for the collection of hypodermic needles used on livestock or pets, integrated, e.g., into the municipal scheme for the collection of health-care risk waste.

Waste water

This guideline does not contain directions for wastewater. There is no unambiguous, technically well founded definition of when, after use, a liquid product shall be disposed of as sanitary wastewater or as waste.

In doubtful cases, contact the local council (i.e., the local council's technical administration office).

As far as stools and other tissue fluids are concerned, they are not to be considered as waste if patients using lavatories or baths flush them out as sanitary wastewater, e.g..

Used chemicals and other discarded liquids, which possess one or more of the properties that make waste hazardous (see Section 2.2, Types of waste), always constitute hazardous waste and must under no circumstances be poured into sewers; see ref. /4/, Paragraph 58.

It can be mentioned that the Directorate of Labour Inspection statutory order on biological agents /12/ sets requirements on the deactivation of waste water from *industrial processes* prior to discharge, if that water contains biological agents belonging to risk groups 2, 3 or 4, cf. Section 6.2. In the case of large quantities of culture liquids from industrial processes, the statutory order sets similar requirements on deactivation prior to disposal.

4 Planning of management systems

This chapter reviews the requirements and options when planning and controlling management systems for health-care risk waste, as well as the Danish EPA's recommendations thereon. This chapter also gives a brief description of a number of conditions set on the working-environment, which must be satisfied through appropriate planning, together with recommendations on training the personnel who generate and handle health-care risk waste.

Chapters 8 and 9 of this guideline contain checklists for municipal schemes and other local schemes, respectively, to aid the detailed planning and organisation of specific schemes.

4.1 General

The management, planning and registration of health-care risk waste is regulated by the Ministry of Environment and Energy statutory order on waste /4/.

Statutory order on waste

According to this statutory order, local councils are the authorities responsible for waste management. Thus, local councils shall collect or designate disposal facilities for all waste generated in their areas (see ref. /4/, Paragraph 35), and all citizens, landowners and enterprises are

obliged to use the designated waste-management facilities; see ref. /4/, Paragraph 39.

For hazardous waste generated by enterprises (i.e., including health-care risk waste), the statutory order on waste stipulates that local councils shall implement *waste-gathering schemes in the form of collection schemes*. Minor quantities of hazardous waste can, however, be collected through delivery schemes, e.g., to municipal reception sites; see ref. /4/, Paragraph 54. The Danish EPA is of the opinion that health-care risk waste from the primary health-care sector can normally be described as "minor quantities" and is, therefore, not covered by the requirement on waste-gathering schemes in the form of collection schemes. It is, however, recommended that the waste - with due consideration for its type, quantity and transport distance - should as far as possible be gathered through a collection scheme integrated, for instance, into the collection of other hazardous waste, such as amalgam filters, medicine residues and chemical residues, from the primary health-care sector.

The generators of hazardous waste, including health-care risk waste, shall report their waste to their local councils; see ref. /4/, Paragraph 50. Such reporting (the purpose of which is to give the local council an overview of the composition of hazardous waste, partly with a view to establishing collection schemes) shall contain information on the type of waste (health-care risk waste can be found under waste catalogue code 18 00 00), its origin, quantity, packaging, composition and properties.

ADR regulations, etc.

Transportation of health-care risk waste by road must satisfy the directives on packaging etc., in pursuance of the ADR Convention /5/. This convention is implemented by Ministry of Transport Statutory Order No. 762, of 20 August 1996, on the transportation by road of hazardous goods /35/. Satisfaction of the ADR directives entails more stringent requirements on the packaging and transportation of health-care risk waste, in comparison with earlier practice and with the packaging that was used earlier. These more stringent requirements stipulate more careful planning of the management of health-care risk waste from the standpoints of the purchasing of packaging, contracting of waste collection, etc.

To the extent that health-care risk waste is transported by rail, ship or air, directives pursuant to the respective conventions shall apply (RID, IMDG code and ICAO regulations, respectively). It should be noted that ADR-compliant packaging automatically guarantees satisfaction of the named conventions.

EIA statutory order

In connection with the actual treatment of health-care risk waste, it is important to note that the establishment of incinerator plant/furnaces for such waste is covered by the Ministry of Environment and Energy

statutory order on the assessment of the impacts of large plant on the environment (EIA) /28/ and its associated guide /29/; see ref. /28/, Paragraph 3.

4.2 Provisional Orders

By issuing Provisional Orders, local councils shall regulate the scope and organisation of collection schemes, and designate management options for waste that is not within the scope of a collection scheme; see ref. /4/, Paragraph 21.

The Provisional Orders for a collection scheme shall stipulate provisions governing the scope of the scheme, i.e., waste types, user groups and geographical area, together with the rights and duties of the users. Local councils can also stipulate provisions for (see ref. /4/, Paragraph 22):

- Containers (including types, number, location, purpose, filling, cleaning and emptying);
- Sorting of waste;
- Information on the waste;
- Environmental targets.

Carrier

Enterprises that collect and transport waste generated commercially in the local area shall register themselves with the local council. Enterprises that are subject to this requirement shall keep records of transported quantities of hazardous waste (also including health-care risk waste), the origin of the hazardous waste and the delivery point. The records shall be kept for 5 years; see ref. /4/, Paragraphs 12 and 14.

The Provisional Orders can stipulate provisions (see ref. /4/, Paragraphs 31) requiring that waste carriers shall, e.g.:

- Handle the waste in accordance with the waste-management options designated by the local council;
- Provide the local council with information and documentation on the quantities of waste transported, waste fractions and the waste's points of origin and delivery;
- Only collect waste that has been sorted and packaged in pursuance of the regulations of the Provisional Orders thereon;
- Only collect waste that is placed in labelled containers etc., in pursuance of the regulations of the Provisional Orders thereon;
- Only collect waste if it has been declared in pursuance of the regulations of the Provisional Orders thereon;
- Only use special collection materials.

To ensure sound, secure management, the Danish EPA recommends that the Provisional Orders governing the management of health-care risk waste stipulate relatively detailed provisions.

Moreover, it is worth mentioning that common schemes for health-care risk waste and other hazardous waste can be established.

4.3 Registering of waste quantities

Health-care risk waste shall be registered in all phases:

- The generators of hazardous waste (including health-care risk waste) shall report their waste to the local council. Such reports shall include information on the relevant waste catalogue code, origin of the waste, quantity, packaging, composition and properties; see ref. /4/, Paragraph 50;
- The generators of hazardous waste shall keep a register of the quantities and types (waste catalogue codes) of hazardous waste and its management. Such registers shall be kept for 5 years; see ref. /4/, Paragraph 53;
- Enterprises that commercially collect and transport waste generated in the local area shall keep a register of the transported quantities and types of hazardous waste (waste catalogue codes), the generators of hazardous waste and the delivery point of the waste. Such registers shall be kept for 5 years; see ref. /4/, Paragraph 14;
- Enterprises that treat and dispose of waste shall keep a register of the types, fractions, origins and quantities of the waste. Information covering the previous calendar year shall be reported to the local council by not later than 31 January; see ref. /4/, Paragraph 15.

Waste catalogue codes

To facilitate the identification of waste at the waste generators' premises, the waste catalogue codes shown in "Listen over affald" ("List of Waste") shall be used. This list implements the European Waste Catalogue, which was drafted pursuant to Council Directive 75/442/EEC on waste /1/. The list is a non-exhaustive list of waste. The list exists as Annex 2 of the statutory order on waste /4/. Waste catalogue codes are also known as EWCs. An extract from "Listen over affald" can be found in Annex D.

ISAG

The information system for waste and recycling (ISAG) is used to facilitate the registration of reports from plants that treat and dispose of waste. The ISAG does not record health-care risk waste received from the individual generator of the waste, but only the sources in the main commercial groups. Health-care risk waste is registered under the designation "special hospital waste" in the ISAG.

4.4 Supervision

The local councils supervise, for instance, observance of the Environmental Protection Act and the rules sanctioned by Danish law, observance of orders and prohibitions, and observance of the conditions stipulated in connection with approval; see ref. /7/, Paragraph 65. The county councils monitor the state of the environment in their areas and selected enterprises that cause particularly severe pollution; see ref. /7/, Paragraph 66. Regardless of the above, the local councils supervise enterprises operated by the county councils and vice versa; see ref. /7/, Paragraphs 65, Item 5, and 66, Item 4.

This supervisory authority ensures that the enterprises' waste is within the scope of the Provisional Orders. The supervisory authority also ensures that the enterprises' hazardous waste (including health-care risk waste) is covered by a collection scheme or that the hazardous waste is covered by an exemption; see ref. /4/, Paragraphs 54 and 56.

The supervisory authority ensures that the waste of enterprises is managed, packed and stored in a sanitary manner and in pursuance of the regulations of the applicable Provisional Orders; see ref. /4/, Paragraph 22.

The supervisory authority also ensures that hazardous waste is not mixed with other hazardous waste or with non-hazardous waste (see ref. /4/, Paragraph 59), and that hazardous waste is packed in a sanitary manner; see ref. /4/, Paragraph 60.

The police supervise the packaging used for the transportation of health-care risk waste by road, which is covered by the ADR regulations /35/.

4.5 Working environment

In general, waste-management work is within the scope of legislation on the working environment, including the Environmental Act /8/, in pursuance of which work shall be planned, organised and performed so that it is safe and sanitary.

At the present time, there is no Department of Labour Inspection circular or other guiding material that is especially concerned with the management of health-care risk waste, although the Ministry of Labour has issued several statutory orders pursuant to the Environmental Act, which are relevant to work with health-care risk waste; see refs. /9/ - /12/, cf. Section 1.4 of this guideline. Concerning the planning and securing of a satisfactory working environment in general, see the provisions of these statutory orders, the Ministry of

Labour instructions on the working environment /30/ and Department of Labour Inspection information sheets /31/, both of which deal with assessment of the workplace. Although a detailed review of the statutory orders is beyond the scope of this guideline, the following provisions should be mentioned:

- In cases where work or the conditions under which work is performed entail a risk of exposure to infectious diseases, effective measures must be adopted for the protection of employees; see ref. /9/, Paragraph 13, No. 4;
- The collection, storage and disposal of waste that contains biological agents shall be carried out using special, labelled containers; see ref. /12/, Paragraph 6, No. 3. In this context, "biological agents" denotes micro-organisms, including genetically-modified micro-organisms, cell cultures and endo-parasites occurring in humans, which are capable of inducing infectious diseases, allergies or toxic effects; see ref. /12/, Paragraph 2;
- When work is performed, it must be ensured that suitable and effective aids, such as lifting devices, means of transport, etc., are available to the extent necessary for the work to be carried out in a safe and sanitary manner; see ref. /9/, Paragraph 10, No. 2. In this context, the phrase "when work is performed" shall be understood to mean all phases of the process. Thus, this can concern the porters, who bring the waste to its place of storage, the carriers, who collect and transport the waste and deliver it to the treatment plant, and the treatment-plant personnel, who are responsible for the operation, maintenance, cleaning, etc., of the plant. In other words, many different types of technical aid can come into question.

The directions of this guideline should also be followed and included in planning.

4.6 Training

Regardless of the nature and duration of employment, employers shall ensure that each individual employee receives sufficient and appropriate training and instruction on performing the work in a non-hazardous manner; see ref. /9/, Paragraph 18. Employees shall receive information on the risks of accident and disease that can be associated with their work, together with information on medical examinations to which they are entitled.

The Danish EPA is of the opinion that, in connection with the more stringent requirements on the sorting, packaging and transporting of health-care risk waste (cf. this guideline), it can be necessary to update present basic training for the above-mentioned personnel in the health-

care sector, transport sector and at waste treatment plants, and to provide further training for these personnel groups.

Although the content of courses must, of necessity, be adapted to the specific needs of the various personnel groups and to the general purpose of the courses, the following subjects should generally be included:

- Definitions of health-care risk waste and infection risk;
- Requirements on internal management, sorting and packing in the health-care sector;
- Requirements on transport packaging and its use, including the requirements on any repackaging necessitated by leaks, etc.;
- Requirements on the labelling of packaging and on the completion of transport documents;
- Information on the appropriate and sanitary organisation of workplaces, including information on the rooms/places used for the collection and storage of waste and from which it is fetched by carriers;
- Information on the cleaning of equipment and on cleaning in the event of accident or suchlike;
- Precautions needed in the event of accident or suchlike, copies of safety regulations and a review of safety equipment.

Concerning the transporting of hazardous goods (also including health-care risk waste), it can be mentioned that drivers shall possess a certificate from a basic course on the transporting of packaged hazardous goods, such as the courses offered by approved public-sector (labour market courses) and private-sector course centres /35/.

4.7 Sorting guide and waste-management plans

Sorting guide

It is recommended that a sorting guide be available to all personnel responsible for the collection and sorting of waste, at all sources in the health-care sector. Such sorting guides should be drafted with consideration for the waste generated by the source in question. Local councils are encouraged to draft sorting guides for waste generators in the primary health-care sector, cf. Annex B, which contains a 3-part model for a sorting guide.

It is also recommended that, in the secondary health-care sector and at major waste generators in general, a person be appointed to assume responsibility for supervising and ensuring that the sorting guide is followed and that personnel receive training and information on sorting, risks, precautions, etc.

Waste-management plans

The Danish EPA is of the opinion that major waste generators (such as hospitals) can advantageously prepare actual waste-management plans

with a view to optimising waste management, including recycling and the minimisation of waste. Such waste-management plans can be drafted separately or in the context of the introduction of general environmental management systems.

Hygiene committees

In collaboration with the managers responsible, hygiene committees (who are responsible for hygiene and suchlike) should be involved in a number of tasks connected with the management of health-care risk waste:

- Drafting of sorting guides and waste-management plans;
- Consolidation of these, through information, organisation and the updating of training activities;
- Purchasing of packaging, external services, etc.;
- Continuous monitoring of sorting at source, packing, labelling, internal transport, storage, external transport and disposal.

5 Collection, packing and storage

5.1 General

The Environmental Protection Act stipulates that everyone who generates, stores, treats or disposes of waste is responsible for ensuring that unsanitary conditions do not occur and that there is no pollution of air, water or soil; see ref. /7/, Paragraph 43.

When collecting, packing and storing health-care risk waste, the following requirements/recommendations shall/should be observed:

- Waste from the health-care sector shall be sorted at source, cf. Section 5.2;
- The collecting and internal transport of health-care risk waste shall be arranged so that patient and treatment sectors are affected as little as possible, and that public access to the waste is restricted, cf. Section 5.3;
- To avoid the above nuisances and unnecessarily large stores of waste, waste collection shall be carried out at appropriate intervals in all phases, cf. Section 5.3;
- Packaging used in transport packaging (cf. ADR) shall be type-approved, cf. Section 5.4;
- Functional requirements should be set, together with rigorous testing, when purchasing packaging, including boxes for hypodermic needles, cf. Section 5.4;
- Internal management of health-care risk waste shall be organised so that manual lifting is limited, cf. Section 5.5;

- Filled packaging should be closed and labelled before it leaves the point where it was generated, cf. Sections 5.6 and 6.4;
- Health-care risk waste shall be stored at a suitable storage point, cf. Section 5.7;
- Health-care risk waste shall be packed in a sound, sanitary manner, cf. Section 6.2, on the ADR;
- Reusable packaging for the collection and transportation of health-care risk waste shall be kept clean, cf. Section 6.5;
- Health-care risk waste must not be mixed with other waste without the permission of the local council, cf. the statutory order on waste; see ref. /4/, Paragraph 59.

5.2 Sorting at source

To ensure the sanitary and optimal management of waste from the health-care sector, the Danish EPA is of the opinion that it is necessary to sort waste where it is generated (at source).

It is recommended that health-care risk waste be sorted at source and packed in suitable packaging, according to the following requirements and guidelines:

- Cutting and pricking objects, such as hypodermic needles, should be placed in suitable, unbreakable containers immediately after use. For the sake of good sealing, the containers should be dry and should not contain disinfectant fluids. Used packaging shall be carefully sealed and labelled before the waste leaves the place where it was generated;
- Other infectious waste should be placed in plastic bags, plastic buckets or suchlike, where it is generated. Packed waste shall be carefully closed and labelled before it leaves the place where it was generated;
- For the sake of satisfactory incineration, tissue waste shall be collected separately (cf. the definition of Section 3.2) and placed in plastic bags, plastic buckets, or suchlike. Packed waste shall be carefully closed and labelled before it leaves the place where it was generated.

The 1984 guideline stated that considering all waste from the wards and departments that generate health-care risk waste as being health-care risk waste attains the most suitable sorting. This view has now been changed, so that only waste, which actually presents an infection risk, should now be considered and managed as health-care risk waste. It is, however, important that waste is considered as health-care risk waste in doubtful cases, and that it be managed in accordance with the provisions thereon. In cases of doubt, queries should be sent to the Departments of Medical Officers of Health, which provide local councils with expert advice on health matters.

The requirements on labelling can be found in Section 5.6.

One condition for sorting at source is that the materials used when collecting (packaging, containers, bags, buckets, etc.) be available at the places at which the relevant types of waste are generated.

5.3 Collection, packaging and internal transport

Collection

It is crucial to the Danish EPA's recommendations that, when sorting at source, the waste be packed in its final packaging and that it be thereafter taken to a suitable storage point, prior to collection for treatment. In connection with this, it is advisable to ensure that packages containing health-care risk waste are not easily accessible to the public. For instance, health-care risk waste should not be stored in corridors or passages to which there is unrestricted access.

Packaging - external management

If waste is to be transported outside an enterprise, all of the packaging must satisfy the requirements stated in the regulations of the ADR Convention, cf. Section 6.2.

Packaging - internal management

Where health-care risk waste is to be disposed of or deactivated within an enterprise, without transportation on public roads (e.g., by incineration or autoclaving in on-site facilities), the packaging need not satisfy the ADR regulations. However, internally-managed waste must still be packed in sealed, sanitary packaging to ensure a satisfactory level of hygiene; see ref. /7/, Paragraph 43.

To minimise the risk of industrial injury when handling waste, health-care risk waste should not be squeezed or compressed into its packaging, which could otherwise incur the risk of perforation. In other words, packaging should not be filled beyond the point at which it can be closed without squeezing the waste.

Repackaging

In cases where packaging has become saturated with water or damaged in any other way, it should be repacked in a larger package of the same or better quality, so that the unsuitable/damaged packaging is not opened, but merely enclosed in a larger, more suitable package.

Collection and internal transport

To avoid such nuisances as odours, health-care risk waste should be collected at suitable intervals. When deciding the frequency of collection, consideration should also be given to subsequent storage times during transportation and treatment.

Waste generators that have centralised collection points (such as hospitals) are recommended to transport filled waste packages to the

central collection point on the day they are filled. Tissue waste should be transported to the central collection point on the day it is generated.

Internal transport

It is recommended that internal transportation of waste be limited to the extent possible by direct transportation from the point of generation to the storage point, without unnecessary delay or diversion. When organising transportation routes, the patient and treatment sectors should be affected as little as possible.

5.4 Requirements on packaging

General

Packaging, which alone or in combination with other packaging constitutes ADR-compliant transport packaging, shall be type-approved for the relevant substance by the Centre for Packaging and Transport, within the Danish Technological Institute /5/. The manufacturer's labelling of the packaging indicates type approval.

Type-approval labelling consists of a combined code, with information on the packaging, its field of application, year of manufacture, etc. The type-approval label always includes a "UN" symbol, *either* (in most cases) as the letters "U" and "N" printed vertically inside a circle *or* simply as "UN" *or* "ADR" *or* "RID/ADR".

Concerning the ADR requirements on packaging, see Section 6.2.

When purchasing packaging - alone or in conjunction with transport services - it is important to request type-approved transport packaging. In the same context, it can be appropriate for the labelling that will be affixed by the waste generator to be standardised to the extent possible, and either pre-printed on the packaging or produced as printed labels.

Packaging not used as transport packaging is not subject to the requirement on type approval, although the use of good-quality packaging (from the standpoints of material and functional quality) is generally recommended.

As it is desirable to reduce the PVC content of waste, and especially of waste destined for incineration, it is recommended that PVC-free packaging be requested wherever possible.

When choosing packaging, it is also advisable to ensure that the size and form of the packaging does not complicate the establishment of clearing arrangements between incinerator plants; see Section 7.2 Incineration.

When purchasing packaging, it is generally recommended that supplementary local functional requirements be set, and that the

selection and testing of packaging be carried out in close co-operation with the concerned personnel groups, as well as the safety and hygiene committee. Areas of relevance when setting specific functional requirements include, e.g.:

- The size and volume of the packaging in relation to the nature of the waste and the quantities of waste generated;
- The types of packaging needed (bags, sacks, containers, buckets, boxes, etc., with their associated stands);
- The necessary sizes of packaging in relation to the composition of the waste (liquid/solid, wet/dry, sharp/blunt);
- The need for maintaining the condition of liquid-filled glass and of containers with lids in the packaging;
- The use of the packaging under sterile working regimes;
- The feasibility of using technical aids to limit manual lifting when handling the packaging;
- Handles, sharp edges, etc.;
- The risk of misuse, especially when closing/sealing, also including the practicability of checking how a package is closed/sealed;
- The empty/full mechanical stability of the packaging, when standing and while being moved/transported;
- Cleaning (where reusable packaging is chosen);
- The need for securing the content from the standpoint of the surroundings (e.g., unauthorised access or if dropped), the need for temporary closing before the packaging becomes filled;
- Handling in the case of overfilling (alleviation thereof).

Packaging for hypodermic

Boxes for hypodermic needles etc., which are used in ADR-compliant packaging, shall be type-approved by the Centre for Packaging and Transport, within the Danish Technological Institute /5/. Type approval is indicated by the manufacturer's labelling of the packaging, cf. the above.

There is no requirement on type approval of hypodermic-needle boxes that are not used in transport packaging.

Due to the importance of the secure packing of hypodermic needles and suchlike, it is recommended that such boxes only be purchased after a precise assessment of their quality. When purchasing these boxes, it can therefore be recommended that supplementary functional requirements be set and, if possible, that the types of box be tested and selected in close co-operation with the concerned personnel groups. Areas of relevance when setting specific functional requirements can be taken from the above list.

Advice through the

The Occupational Health Service offers advice and participation in the

Occupational Health Service planning and implementation of measures that can influence the working environment, as well as proposals for the improvement thereof.

Concerning the selection of packaging, the Occupational Health Service can, for instance, assist in the choice of ergonomically appropriate packaging.

5.5 Manual lifting

When organising waste systems and choosing containers, technical aids, etc., several circumstances pertaining to manual lifting must be taken into consideration. These are stated in Directorate of Labour Inspection Circular No. 10, 1990, on the design of waste systems etc., /32/ and Department of Labour Inspection information sheets No. 4.05.2, of October 1994, on evaluating lifting devices /33/. The Directorate of Labour Inspection is now revising circular No. 10/1990 and will publish an instruction to replace the circular during 1998.

For instance, 11 kg is considered the maximum burden that will not normally constitute a health hazard, when that burden is close to the body and the lifting movement is performed while stationary. The weight limit is reduced when the arms are extended or the movement is not performed while stationary /33/.

In many cases it will be necessary to use mobile equipment or other aids for manual handling.

5.6 Labelling of packaging

When collecting waste from the places where it was generated, it is recommended that the personnel who carry out the internal collection and transporting of waste check that the packaging does not leak and that it is clearly labelled with the waste type and place of generation.

Such checks should not be performed if they entail direct contact with the waste. Any defects should, instead, be rectified with the help of the personnel at the place of generation.

A visible yellow label and a label marked *"health-care risk waste"* should be affixed to the outside of the packaging. The outer packaging of tissue waste etc. should also be labelled *"tissue waste"* for the sake of its final treatment.

When health-care risk waste is destined for external transport, the packaging should be labelled on the outside with the date, name and telephone number of the generator, as well as the name of the person

responsible for packing, and should otherwise be labelled in accordance with the requirements on labelling stated in the ADR regulations /5/, cf. Section 6.4.

To avoid misunderstandings when sorting at source and when collecting, it is generally recommended that packaging be labelled *before* it is taken into use.

5.7 Waste storage and storage rooms

The correct storage of health-care risk waste contributes to sound and sanitary handling from the standpoints of the environment and working environment. The establishment of storage rooms and drafting of working procedures for these rooms are crucial elements in the organisation of waste management.

Special attention is devoted to treatment plants in the Building Regulations, issued by the National Building and Housing Agency /34/.

The primary fields of application of the Building Regulations are new apartment housing projects and all forms of commercial and institutional building projects. The Building Regulations apply, for instance, when erecting new buildings, extending buildings, converting buildings and other changes to buildings, which are substantial in relation to building legislation or to the provisions of the Building Regulations.

The Building Regulations state that waste plants shall be safe and sanitary and shall give the greatest possible consideration to waste systems that promote recycling. Of the specific requirements of the Building Regulations, the following can be mentioned (see ref. /34/, Paragraph 12.6):

- Waste containers, boxes, etc., shall be located at the same level as the approach for waste collection, or so that the waste can easily be collected using suitable technical aids;
- If a room is organised for waste storage, the Building Regulations states requirements on materials and construction methods from the standpoint of fire protection. Furthermore, waste storage rooms must have access doors to the outdoors. Ventilating plant, which must either be extraction plant combined with openings to the outdoors or combined blowing and extraction plant, shall ventilate such rooms. Outdoor air shall enter through gratings or other floor-level openings. The area of the openings shall be sufficient to pass an air flow that corresponds to the extracted flow, which shall be 1 l/s/waste

container, but not less than 15 l/s. When using blowing plant, the air flow blown in shall correspond to the extracted flow.

When organising waste rooms for storing several types of waste, the different fractions shall be kept apart and shall be marked with the type of waste.

Finally, it is recommended that such room be lockable and be kept locked.

5.8 Health-care risk waste from decentralised patient care

The waste from decentralised patient care (home care, round-the-clock care, etc., normally consists of material that can be managed as ordinary waste, although health-care risk waste can also be encountered.

Concerning the management of health-care risk waste, one possibility is to let the nursing personnel who make the visits take responsibility for collecting the health-care risk waste resulting from their visits. This approach demands that general requirements on hygiene not be neglected, e.g., it must be possible to pack the waste in a sanitary manner (airtight, impact-resistant, etc.,) for transporting, and collection from a suitable location must be arranged, e.g., at the nurse's district office. In such an approach, the individual nurses should transport the health-care risk waste from their own visits. Collection points for health-care risk waste from decentralised patient care must adhere to the directions on storage and storage rooms stated in this guideline.

Health-care risk waste from decentralised patient care can also be covered by a health-care risk waste collection scheme or by regulations issued by the local council, i.e., when the waste is separately collected from the individual patient's home. In such cases, it is recommended that the financial costs for a collection scheme be covered by the ordinary municipal waste-collection charge, and not be debited to the patient.

6. Transport

6.1 General

The Environmental Protection Act

The Environmental Protection Act stipulates that everyone whom generates, stores, treats or disposes of waste is responsible for ensuring that unsanitary conditions do not arise and that air, soil and water are not polluted; see ref. /7/, Paragraph 43.

The following requirements shall be observed when transporting health-care risk waste:

- The packaging and transporting of health-care risk waste must satisfy more stringent requirements pursuant to the ADR regulations, cf. Section 6.2;
- The handling of packages in connection with transportation must be organised so that manual lifting is avoided, cf. Section 6.3;
- The vehicles etc., used for transporting health-care risk waste must be kept clean, cf. Section 6.5;
- Health-care risk waste must not be mixed with other waste without the permission of the local council, cf. the statutory order on waste (see ref. /4/, Paragraph 59);
- Packaging that is damaged during transportation must be repacked, preferably with the use of larger packaging of at least the same quality, so that the damaged packaging is not opened, cf. the principles mentioned in Section 5.3.

6.2 ADR regulations

The ADR regulations /5/ stipulate rules for the classification, packaging, labelling and transportation of hazardous goods by road, also including waste that contains dangerous substances. The ADR Convention applies to international road transport, and since 1 January 1997, also to national road transport, together with the deviations pursuant to Ministry of Transport Statutory Order No. 762, of 20 August 1996, on the transportation of hazardous goods by road.

Class 6.2 of the ADR regulations covers infectious substances and, thus, also *waste* that contains infectious substances (health-care risk waste).

Annex C contains a summary of the ADR requirements. For detailed information, see the provisions of the ADR regulations.

Concerning risk waste that can be expected to be generated under normal circumstances in decentralised patient care, doctors' visits, etc., the ADR rules grant exemption to enterprises that, as a subordinate activity, transport less than 20 kg hazardous goods. Thus, the ADR rules do not normally apply to the transporting of health-care risk waste to common delivery points in connection with decentralised patient care or with the transporting of health-care risk waste generated during the visits of doctors in general practice.

Classification

Infectious substances classified in Class 6.2 are classified into 3 groups, designated "A", "B" and "C", with 5 subordinate points, designated "1", "2", "3", "4" and "11". The infectious substances are referred to four risk groups, designated "I", "II", "III" and "IV". Their definitions are given below.

The groups and subordinate points are defined as:

A infectious substances of high potential risk:

1 infectious substances, dangerous to humans (risk group IV)
infectious substances, dangerous only to animals (risk group IV)

2 infectious substances, dangerous to humans (risk group III)
infectious substances, dangerous only to animals (risk group III)

B other infectious substances:

3 infectious substances, dangerous to humans (risk group II)
infectious substances, dangerous only to animals (risk group II)

4 unspecified health-care risk waste (this subordinate point should be understood as including substances classified in risk group I)

C empty packaging, which has contained substances belonging to Class 6.2

11 non-cleaned, empty packaging, etc., which has contained substances belonging to Class 6.2.

The four risk groups used in the ADR are also used in Directorate of Labour Inspection Statutory Order No. 864, of 10 November 1993, on biological agents and the working environment /12/, but with slightly amended wording as they are only intended for the protection of employees. The definitions in the ADR are:

IV (high individual risk, high risk to society) covers micro-organisms that can cause serious diseases in humans or animals, that can present a high risk of spreading and for which no effective prophylactics is normally possible. The Ebola virus is an example of a virus belonging to risk group IV;

III (high individual risk, low risk to society) covers micro-organisms that can cause serious diseases in humans or animals, and that can present a high risk of spreading but for which an effective prophylactic method or treatment is normally available. Hepatitis B is an example of a virus belonging to risk group III;

II (Moderate individual risk, limited risk to society) covers microorganisms that can cause diseases in humans or animals, but which probably do not spread and for which an effective prophylactic method or treatment is normally available. Several types of Salmonella bacteria belong to risk group II;

I (low risk to individuals and society) cover microorganisms that can hardly cause disease in humans or animals.

Apart from health-care risk waste from special laboratories, health-care risk waste typically contains microorganisms belonging to risk groups I and II. Special laboratories that generate waste containing micro-organisms belonging to risk groups III and IV typically have their own treatment facilities for the waste (deactivation, cf. Section 7.3). There is, therefore, only a limited need for transporting health-care risk waste containing microorganisms belonging to risk groups III and IV.

Hypodermic needles, which are potential carriers of infectious substances classified in risk groups III and IV, are generated by many sources of health-care risk waste. On condition that the needles are packed in sealed, impact-resistant needle boxes, the Danish EPA is of the opinion that such boxes can be transported in accordance with the rules for subordinate point 3.

Requirements on packaging, cf. ADR

The packaging regulations applicable to subordinate points 3 and 4 (i.e., corresponding to risk groups I and II), which constitute by far the greatest part of health-care risk waste, are discussed below.

The ADR lists a range of packaging for packing the substances classed as belonging to subordinate points 3 and 4. For instance, the following can be mentioned (more detailed specifications in the ADR):

- Drums of steel and aluminium;
- Plastic drums or plastic cans;
- Combination packaging.

Combination packaging consists of internal packaging and external packaging. Typical *internal packaging* includes, e.g.:

- Glass, porcelain or stoneware packaging;
- Plastic packaging;
- Metal packaging;
- Bags and sacks of paper, textile, woven plastic or plastic sheeting.

Typical *external packaging* includes, e.g.:

- Drums of steel or aluminium;
- Drums of plastic or paper;
- Boxes of plastic or paper.

Type approval

As mentioned in Section 5.4, type approval is required for ADR packaging.

6.3 Manual lifting

Section 5.4 describes the rules governing the design of waste systems, including the use of manual lifting devices. The provisions also apply to transportation, in which vehicles should only be loaded with the use of technical aids that limit manual lifting.

6.4 Labelling

The ADR regulations require the following labelling on packaging:

- Type-approval labelling of the packaging itself pursuant to UN type approval; see Section 5.4. This labelling, which is specific to the type of packaging, is affixed by the supplier of the packaging;
- Danger label No. 6.2 shall be affixed. This label is reproduced in Annex C. The UN number and the type of waste, together with any voluntary labels must be affixed below the danger label.

Finally, the packaging must be accompanied by a transport document and written instructions (transport emergency card), which states the UN number and the type of waste, together with information on the dangerous properties of the transported substance and information intended for use in the event of an accident /5/.

The voluntary label is discussed in Section 5.6.

6.5 Cleaning

Reusable packaging, vehicles, etc., must be kept clean and sanitary for their purpose. Cleaning should be carried out with the aid of technical aids and, to the greatest extent possible, automatically.

Cleaning can, for instance, be done with cold or lukewarm water and detergent, followed by disinfection, e.g., with hot water.

When cleaning with high-pressure equipment, beware of spreading aerosols, cf. Directorate of Labour Inspection Memorandum No. 4.04.18, on working with high-pressure equipment /36/.

When using reusable packaging, cleaning must be organised so that there is no risk of transferring infection or of non-sanitary conditions /7/. The cleaning of reusable packaging by the individual waste generators is not recommended because of the risk of transferring infection and of creating non-sanitary conditions on the generator's premises.

It should be noted that packaging, which has contained health-care risk waste but which has not been cleaned, must comply with the same rules when transported as filled packaging, cf. the ADR regulations /5/.

7 Treatment

7.1 General

The Environmental Protection Act stipulates that everyone who generates, stores, treats or disposes of waste is responsible for ensuring that unsanitary conditions do not arise and that air, soil and water are not polluted; see ref. /7/, Paragraph 43.

When treating health-care risk waste, the following requirements/recommendations shall/should be observed:

- Health-care risk waste that has not been deactivated, cf. Section 7.3 shall by disposed of by incineration, cf. Section 7.2;
- Health-care risk waste shall be incinerated at plants that have been specially designed and approved for the treating of such waste, cf. Section 7.2;
- Measures appropriate for the working environment, including the use of personal protective devices and clothing, shall be used in all operational situations where manual work must be done at the risk of direct contact with health-care risk waste, cf. Section 7.2;
- With certain exceptions, deactivated health-care risk waste can be handled as domestic-type waste and other waste, cf. Section 7.3;
- The management of health-care risk waste shall be organised so that problems of the working environment, including heavy or frequent lifting and all forms of direct contact with the waste, are avoided, cf. Sections 7.2 and 7.4;
- Health-care risk waste must not be mixed with other waste without the permission of the local council, unless permission pursuant to the Environmental Protection Act has been granted, cf. the statutory order on waste; see ref. /4//, Paragraph 54.

7.2 Incineration

The Danish EPA is of the opinion that incineration is the most suitable method of treating health-care risk waste today. There are other methods of deactivation, cf. Section 7.3, which can secure sound, sanitary disposal, but incineration is advantageous as it can also ensure the non-recognition of tissue waste.

Health-care risk waste shall be incinerated at plants that have been specially designed and approved for the treating of such waste. Plants for incinerating health-care risk waste are covered by Point K9 "waste

incinerator plant" of Ministry of Environment and Energy Statutory Order No. 794, of 9 December 1991, on the approval of enterprises that cause particularly severe pollution, and are thereby covered by the approval scheme of the Environmental Protection Act, Part 1. The county councils are the approval and inspection authorities for incinerator plants. Although not obliged to do so, county councils can review approval every four years. Before a county council can grant environmental approval to plants intended for incinerating hazardous waste, including health-care risk waste, an EIA must be conducted, in the form of a regional planning supplement that includes an assessment the plant's impact on the environment /28/.

The statutory order on waste stipulates a requirement on the disposal of waste that is suitable for incineration; see ref. /4/, Paragraph 30. That requirement also applies to health-care risk waste, which has already been deactivated and which is suitable for incineration, cf. Section 7.3. Such health-care risk waste can be incinerated together with domestic waste and suchlike, unless it is tissue waste, which must be burned on a hearth, in a separate furnace or in an equivalent way that guarantees non-recognition and total incineration.

Main requirements on the incineration of health-care risk waste

The maintenance of sanitary conditions at incinerator plants presumes - apart from conscientious operation, maintenance and cleaning of the plant - that health-care risk waste be handled separately from other waste, that such handling be carried out according to special operating regulations and with the greatest possible application of automation and technical aids, to limit physical contact with the waste.

County councils can set the following main requirements on the incineration of health-care risk waste:

- That complete burnout of solid and gaseous residues is guaranteed;
- That the incineration of health-care risk waste take place at incinerator plant, the emissions, operating conditions and residues of which are of the same standard as at incinerators for domestic-type waste and suchlike /6/;
- That health-care risk waste be fed automatically and separately and that:
  - The risk of opening packages and of exposing health-care risk waste before and during feeding into the combustion zone be minimised through the appropriate design of the entire plant and the use of suitable packaging;
  - That grate riddling be collected separately, automatically and incinerated;
  - That, in the case of manual work in the plant, the necessary measures are taken to protect the working environment.

The point of departure of this guideline's directions is not the specific feeding method, but that an appropriate combination of the technical design of the entire incinerator plant, its operating rules and the measures adopted to protect the working environment guarantee *a satisfactory working environment at all incinerators for health-care risk waste.* These measures can depend on the feeding method chosen. The local workplace assessment shall therefore show the feeding method used at the plant, its inherent risks and the measures that have been, or will be, adopted in this connection. It is recommended that the Occupational Health Service be involved when organising the precautions needed for the working environment.

Separate and individual feeding straight into the combustion zone, of packages containing health-care risk waste, has been the preferred method at incinerator plants where such waste is treated together with other types of waste (e.g., by feeding through the lateral wall of the furnace, at incinerator plants that treat domestic waste and similar waste), as direct feeding restricts the quantity of health-care risk waste inside the plant in the event of unintentional shutdown.

In certain types of incinerator plant, separate feeding can incur a risk that the health-care risk waste will not be totally incinerated. An extra opening can affect control of the plant and, thus, the operation of the entire plant. Co-feeding of health-care risk waste with other waste (e.g., in the form of hopper feeding) could be considered in such cases.

Thus, feeding directly to the combustion zone and co-feeding are both possible alternatives. Co-feeding requires, for instance, that the packaging used be suitable for co-treatment and that it should not open prior to incineration, that the feeding operations be monitored and controlled, that grate riddling be collected separately and automatically and incinerated, and, finally, that special precautions be taken if manual operations involve any risk of contact with health-care risk waste.

Precautions when shutting down health-care risk waste incinerators

If the need arises for manual intervention at an incinerator plant, the plant shall be shut down smoothly to permit complete burnout of all health-care risk waste, before intervening. After emptying the plant of health-care risk waste, it is necessary to observe special precautions in the "cool" parts of the plant, i.e., in areas where the temperature was not sufficiently high prior to shut-down (such as areas at/close to the feeders and collection systems for grate riddling). Such areas shall be cleaned according to the precautions mentioned below.

When a plant is shut down for planned maintenance, or when situations arise in which it is not possible to shut the plant down smoothly and, thus, empty it of health-care risk waste (including blocking and suchlike during feeding), the precautions necessary in such cases should at least include:

- Cleaning of the working areas where health-care risk waste can be found, e.g., with a portable oil burner or with steam;
- The use of technical aids, to prevent physical contact with health-care risk waste;
- Limitation of human presence in boiler rooms etc., to the smallest possible area and limitation to the extent possible of the time spent therein (for instance, routine repairs should not be done in connection with such shut-downs if they would entail contact with health-care risk waste);
- Only specially trained and instructed people should participate in the task;
- Personal protective devices and clothing.

The use of personal protective devices and clothing is required in all operating situations when manual work must be done at the risk of direct contact with the waste. In preparation for manual work in a shutdown incinerator furnace (or corresponding area of the incinerator), where health-care risk waste can be encountered, it is vital to protect employees with suitable clothing that prevents the occurrence of lesions and tears. Dust and aerosols should also be avoided and respiratory equipment must be used in their presence. Protective clothing must be cleaned after use and there must at least be facilities for washing the hands immediately after removing the protective clothing. See Directorate of Labour Inspection Statutory Order No. 746, of 28 August 1992, as amended on 23 March 1994, on the use of protective devices and clothing /38/, No. 1273, of 18 December 1996, on safety requirements set on protective devices and clothing /39/, as well as a number of information sheets, e.g., on eye protectors, respiratory equipment and protective footwear.

It must be emphasised that the use of protective devices and clothing is considered to be *supplementary* to the other precautions pertaining to the working environment.

It is recommended that the Occupational Health Service be involved in organising the precautions relevant to the working environment and the use of protective devices and clothing.

The Danish EPA recommends that, in connection with approval of plant, plants intended for the incineration of health-care risk waste be subjected to a careful assessment of the total plant design, its associated operating regulations and the necessary precautions relevant to the working environment. Experience from similar types of plant should be included in such assessments.

After approval is granted, considerable weight should be attached to the operating practices and working conditions that prevailed prior to approval, with special emphasis on the risk of blockages in the hopper.

In this context, the Danish EPA recommends that special operating situations, such as shutdowns and operating accidents, be logged separately. This log should include information on the measures taken to protect the working environment and whether or not the plant had been emptied of health-care risk waste after smooth shutdown.

Specific requirements on plant design

The specific requirements on incinerator plant designed for health care risk waste must be set against the background of an assessment of the individual plant. To assist such assessment, the following directions can be used:

- Directives for emissions, operating conditions, residual products, etc., are stated in Danish EPA Guideline No. 2 1993 /6/ with the amendments that apply as a consequence of the amended statutory order on waste incinerator plant /40/;
- A number of operating conditions speak against the incineration of health-care risk waste by co-feeding with domestic-type waste and other waste in small incinerators with movable (open) grates and a furnace capacity of less than 4-5 tonnes/hour, as batch feeding of packages containing compact (heavy) or very wet health-care risk waste can disturb stable, high-temperature operation and, thus, complete incineration;
- Operating experience shows that the incineration of health-care risk waste on a fixed, closed grate (hearth), built into a roasting furnace demands a sufficient flow of flue gas to avoid the formation of clinkers on the hearth and consequent problems with automatic feeders. Operating experience also shows that the hearth approach functions satisfactorily when it is located in the bypass channel before a rotation furnace. Special consideration must be given to the installation of hearths in purely roasting furnaces;
- When using plants with co-feeding together with other types of waste, the treatment of health-care risk waste should not adversely affect the plant's treatment of other waste and vice versa;
- Reception facilities, feeders, etc., must be adapted to the packages received (and vice versa), so that clinker formation, blockages and the influx of false air are avoided;
- To ensure total incineration, the health-care risk waste must be given a sufficiently long time at high temperature in the combustion zone.

Specific requirements on operating conditions

- To ensure reliable and stable operation of the furnace, the co-feeding of health-care risk waste together with other types of waste should be done in a steady stream adapted to the other waste types. Feeding should be controlled by manual activation performed at a position from which the point at which feeding occurs can be monitored and from which the feeding of other waste can be halted;

- Health-care risk waste should not be fed if furnace operation has become unstable, i.e., in situations/periods when large fluctuations are observed in the CO content of the flue gas, the temperature inside the furnace, or when it is not possible to satisfy environmental requirements in other respects;
- In the event of shutting down the incinerator plant, the feeding of health-care risk waste should be stopped in advance so that the plant (feeder, furnace, etc.,) are emptied of health-care risk waste.

Incineration of tissue waste

Tissue waste should be incinerated on a hearth, in a separate furnace or similar, which ensures full burnout of the waste and, thus, non-recognition. In cases where a hearth, separate furnace or similar is not available, the Danish EPA shall designate the destruction of tissue waste by cremation as a suitable method.

Recipient agreements

To ensure the optimal reception and management of health-care risk waste at incinerator plants, it is recommended that, when approving the environmental aspect's of plant, county councils stipulate rules for the reception of health-care risk waste destined for incineration.

It is further recommended that county councils and local councils ensure that agreements on waste reception be signed with carriers so that, e.g., feeding problems are avoided. It is important that the packaging used be adapted to plant feeding systems, for instance, to prevent the packaging from blocking the feeder and necessitating shut-down, the need for manual handling and cleaning.

Storage

After reception, health-care risk waste should be stored in a secure, sanitary way until it is fed to incineration. The place of storage should be kept apart (and suitably locked) from ordinary open spaces and walking areas and should otherwise be organised so that the packages do not become wet or damaged.

Clearing arrangements

To avoid the accumulation of health-care risk waste when repairing incinerators etc., clearing arrangements should be established between waste incinerator plants.

When establishing clearing arrangements, and when an unexpected need to redirect health-care risk waste arises, problems can occur because different management schemes use different packaging sizes which, in some cases, can only be handled properly, and/or in accordance with the environmental conditions of approval, by one or two incinerator plants. For this reason, it is recommended that the choice of packaging size should not restrict the options for disposing of the waste by making it difficult to find other suitable incinerator plants, in the event that the usual incinerator plant(s) are shut down as a result of accident, maintenance, etc.

As an alternative for avoiding the accumulation of health-care risk waste, there should be an agreement that makes it possible to change the supplied packaging quickly, so that the physical form of the packaging does not prevent the continuous disposal of health-care risk waste simply because of temporary shutting down of the usual incinerator plant(s).

7.3 Deactivation

In this context, the "deactivation" of waste means heat treatment or other treatment, which gives documented deactivation of pathogenic microorganisms to such an extent that the waste no longer carries any infection.

Autoclaving

Autoclaving (sterilisation with steam) is an example of a frequently used deactivation technique. The autoclaving of waste is used, for instance, for deactivating waste belonging to risk groups III and IV, cf. Section 6.2.

It is not possible to indicate particular deactivation techniques or to set out general guidelines for deactivation. It can, however, be mentioned that the National Serum Institute (the National Centre for Hospital Hygiene) passes on experience of autoclaving etc.

7.4 Manual lifting

Section 5.5 describes the rules that apply to the design of waste systems, including the use of manual lifting. The directions also apply to disposal, in which the reception, storage and feeding of waste should be implemented using technical aids, to limit manual lifting.

8 Checklist for municipal schemes for health-care risk waste

This chapter contains a dual-purpose checklist intended for assessing existing municipal schemes and for establishing new municipal schemes for managing health-care risk waste.

The checklist is particularly intended for the municipal planners responsible for the planning and organising of municipal waste management, including the drafting of Provisional Orders.

The checklist for assessing existing schemes can primarily give an overview of the main areas in which there is a need for updating the applicable Provisional Orders.

Checklist - assessment of existing schemes

- Is the scheme a collection scheme?
- Is the scheme stipulated in current Provisional Orders?
- Does the Provisional Orders' definition of health-care risk waste agree with this guideline's definition?
- Does the scheme in principle include all waste generators of health-care risk waste in the area?
- Does the scheme set requirements on sorting at source?
- Do the scheme's regulations on the packing and transporting of health-care risk waste comply with the ADR regulations and directives and with the other directions of this guideline?
- Are the procedures for registering with and withdrawing from the scheme satisfactory? And is the list of sources updated continuously?
- Has sufficient information on sorting requirements etc., been sent to the generators of health-care risk waste?
- Is there sufficient supervision of the observance of the scheme's regulations?
- Is the chosen incinerator plant suitable and approved from the environmental standpoint and, where necessary, has it been assessed for its impact on the environment?
- Have clearing arrangements been made with other incinerator plants or equivalents, to guard against accidents, repairs or suchlike?

Checklist - establishing new schemes

Provisional Orders for health-care risk waste should generally be drafted in compliance with the Danish EPA statutory order on waste /4/. Specifically, the Provisional Orders for health-care risk waste should cover:

- Definitions complying with this guideline;
- A requirement to the effect that all generators of health-care risk waste is registered with a collection scheme;
- Possibilities for exemption from the registration obligation if a waste generator can document sanitary management of the waste;
- A requirement on sorting at source in compliance with the directions of this guideline;
- Requirements on collection, packing and storage in compliance with the directions of this guideline;
- Requirements on transportation in compliance with the directions of this guideline;
- Requirements on treatment in compliance with the directions of this guideline;

- Directions on registration with, and withdrawal from, stipulated schemes;
- Directions on the supervision of observance of the scheme's regulations;
- Directions on reporting.

In addition, it should be ensured that:

- All generators of health-care risk waste are informed of the regulations and their provisions;
- The list of generators of health-care risk waste is updated continuously;
- The incinerator plant is suitable and has environmental approval for treating health-care risk waste and, if necessary, has been assessed for its impact on the environment;
- Clearing arrangements have been made with other incinerator plants or equivalents, to guard against accidents, repairs or suchlike.

9 Checklist for schemes for the generators of health-care risk waste

This chapter contains a checklist intended partly for assessing existing local schemes for managing health-care risk waste in the health-care sector and partly for establishing new schemes on the premises of the generators of health-care risk waste.

The checklist is particularly intended for the administrators responsible for planning and performing waste management on the premises of waste generators.

In general, it is to be expected that it will be necessary at most places in the health-care sector to revise the sorting and management guidelines for health-care risk waste, partly as a result of the amended requirements on packaging.

The checklist for assessing existing schemes can primarily give an overview of the main areas in which there is a need for updating current procedures, sorting guidelines, etc.

Checklist - assessment of existing schemes

- Has a sorting guideline been drafted for health-care risk waste?
- Does that guideline's definition of health-care risk waste agree with this guideline's definition?
- Have requirements been set on sorting at the point of generation?
- Do packaging requirements comply with the ADR regulations and with the other directions of this guideline?
- Does the use of manual lifting and technical aids in waste disposal comply with the Directorate of Labour Inspection regulations?
- Do personnel who bear the daily responsibility for sorting and packing health-care risk waste have sufficient information, including up-to-date information on working conditions, precautions in the event of accidents, any packaging difficulties, etc.?
- Is the waste reported to the local council?

Checklist - establishment of new schemes

In general, a sorting guideline should be drafted for health-care risk waste. Such guidelines should contain:

- Definitions complying with this guideline;
- Guidance on sorting at source in compliance with the directions of this guideline;
- Guidance on collection, packing and storage in compliance with the directions of this guideline;
- Guidance on technical aids etc., for limiting manual lifting;
- Guidance on the precautions necessary in connection with accidents;
- General information on further transportation and treatment of the waste;
- Lists of the most common types of health-care risk waste generated by the various waste generation points.

It should be ensured that:

- The sorting guideline is readily accessible at all points where health-care risk waste is collected;
- The relevant personnel are instructed on the content of the sorting guideline, including the immediate instruction of new personnel at the start of their employment;
- The relevant personnel receive continuous feedback on errors in collecting; packing and storing waste;
- A person responsible for instruction and training is appointed at the major generators of health-care risk waste;
- The local scheme is continuously assessed in collaboration with the parties responsible for the municipal collection scheme, with a view to optimisation;
- Reports are sent to the local council.

ANNEX A Waste generators

This annex contains a list of waste sources in the primary and secondary health-care sectors.

It should be noted that the list is not complete. All waste generators that generate the waste covered by this guideline must manage it in compliance with the directions of this guideline.

Waste sources in the primary health-care sector:

- Doctors in general practice and specialists, community health centres, etc.;
- Practising dentists, dentists at municipal and regional clinics, dentists at teaching establishments and dental assistants;
- Practising midwives, pre-natal clinics;
- Home-care schemes;
- Nursing homes;
- Patients (e.g., diabetics).

Waste sources in the secondary health-care sector:

- Hospitals;
- Treatment institutions and homes;
- Sanatoriums;
- Clinics and out-patients clinics;
- Medico-legal institutes.

Other waste sources:

- Medical research institutes;
- Laboratories, pathological laboratories, etc.;
- Foodstuffs supervision units;
- Acupuncturists;
- tatooists;
- Cosmetologists.

ANNEX B Model for guidelines on sorting health-care risk waste

This annex contains a model for guidelines on sorting health-care risk waste. The sorting guideline is organised in 3 parts.

1) General directions on managing health-care risk waste, which can be of relevance to all waste generators. These directions are intended to ensure that waste *in general* is managed in a sanitary

way and that the necessary precautions are taken to protect the working environments of relevant personnel.

2) The general sorting guideline, which is based on the definitions of this guideline.

3) Summary table of waste schemes of relevance to the individual waste generator. This table is especially intended for waste generators in the primary health-care sector. It is suggested that summary tables be prepared under the auspices of the local council, in the form of local-council information for waste generators, on municipal schemes and on interaction between them. In the case of waste generators in the health-care sector, this is primarily a matter of the schemes for health-care risk waste, hazardous waste other than health-care risk waste and domestic-type waste that are relevant and where there is interaction. The summary table contains the following headings:
   - *Scope.* Definitions of the waste, together with the waste generators covered by the scheme, can be entered under here;
   - *Packaging.* Requirements on packaging, labelling, etc., can be entered here;
   - *Waste carriers and treatment.* The names and addresses of waste carriers, treatment plants, reception stations for hazardous waste and the municipal administration from which more detailed information can be obtained, can be entered here;
   - *Collection.* Collection frequency, possibly including the relevant weekday, can be entered here. Special requirements on collection, in the form of conditions of access, can also be entered here;
   - *Examples of waste.* With access to the general definitions there should be no doubt about the sorting of by far the greatest part of the waste. Doubts usually concern waste in the "fringe areas" - as far as health-care risk waste is concerned, e.g., Chemotherapy medicine residue, ostomy bags, napkins, etc., cf. Section 3.2 of this guideline. Such examples can be emphasised in this column.

In the case of waste generators in the secondary health-care sector (i.e., large sources), it can be advantageous to draft specific sorting instructions for individual wards and for the personnel involved in internal waste management.

1 General guidelines for managing health-care risk waste

- Look after yourself and your co-workers. Inform yourself about the waste system. Ask, when in doubt, and help your co-workers.
- Check daily that the right packaging is always available at the point where waste is generated and that it is used.
- Keep everything clean and tidy. Note any non-sanitary conditions. Remember personal hygiene.
- Only use the packaging intended for the relevant type of waste. As far as possible, pack waste in the final packaging (transportation packaging).
- Use unbreakable packaging for pricking/cutting waste. Be careful with glass shards and chipped glass.
- Check that packaging is clean and intact before taking it into use.
- Label packaging with the appropriate waste type before taking it into use.
- Do not mix different types of waste - pay attention to the labels.
- *Always* use gloves and other mandatory protective devices and clothing when handling waste and packages.
- Pack waste immediately after it has been generated.
- Wrap up wet and dripping waste.
- Do not overfill packages.
- Do not compress waste.
- Clean up immediately in the event of spillage.
- Place containers, bottles and suchlike containing health-care risk waste securely in the packaging, so that they do not tip over.
- *Always* use the mandatory technical aids when handling packaging.
- Check the labels and add information on waste type and generator, etc.
- Close the packaging securely before it leaves the point where it was generated.
- Repack in the event of damaged packaging - in larger packaging if possible - without opening the damaged package.
- Call the responsible person in case of doubt.

2 General sorting guidelines

Waste type	Examples	Packaging	Comments
Health-care risk waste - pricking/cutting	Hypodermic needles knives, guide wires, scissors, tweezers, suture needles, drip chambers and suchlike, which can penetrate skin.	Unbreakable, sealed packaging (containers etc.), which can be closed securely.	
	Test tubes, shards and suchlike, which contain blood, pus or tissue parts.	If the packaging is to be used in transportation, it must be ADR-compliant.	No liquids must be added to the container - not even disinfectant liquids.
	Laboratory glassware contaminated with blood, pus or tissue fluids, haemoglobin cuvettes, capillary tubes and pipettes.		
Health-care risk waste - isolation patients	All waste from patients who are in isolation, unless knowledge of the disease's infection routes makes the risk negligible at disposal time.	Sealed packaging (plastic bags, lined sacks, and plastic buckets, containers and suchlike, which can be closed securely. If the packaging is to be used in transportation, it must be ADR-compliant.	
Health-care risk waste - infectious in other respects	Petri dishes and suchlike, which contain live bacterial, viral or fungal cultures.		
	Urinals and suchlike, with blood, pus or tissue fluids that have not been effectively deactivated.	Sealed packaging (plastic bags, lined sacks, plastic buckets, containers or suchlike), which can be closed securely.	
	Very wet disposable materials (which would drip if squeezed), where the fluid consists of tissue fluids, pus or blood from patients, such as bandages, surgical drapes, operation napkins, napkins or sanitary towels	If the packaging is to be used in transportation, it must be ADR-compliant.	
	Residues of live vaccine		
	All tissue from experimental animals, which contains microorganisms pathogenic to humans.		Recognisable tissue and body parts, as well as other waste where non-recognition after treatment is considered appropriate for aesthetic reasons, is classified as *tissue waste* and as *health-care risk waste.*

Tissue waste	Recognisable tissue and body parts, as well as other waste where non-recognition after treatment is considered appropriate for aesthetic reasons. Examples of tissue waste include, e.g., placentas, aborted foetuses, tissue samples, also including tissue samples preserved in formalin, and amputated body parts.	Sealed packaging (plastic bags, lined sacks, plastic buckets, containers or suchlike), which can be closed securely. If the packaging is to be used in transportation, it must be ADR-compliant.	Tissue waste that is also covered by the definition of health-care risk waste is classified as *tissue waste* and as *risk waste/*hazardous waste.
Hazardous waste other than health-care risk waste	Chemotherapy medicine residue.	Sealed packaging (plastic bags, lined sacks, plastic buckets, containers or suchlike), which can be closed securely. Chemotherapy medicine residues must be disposed of in their original packaging or other suitable packaging.	Waste that contains blood, pus or tissue fluids *and* chemotherapy medicine residues must *either* be handled as health-care risk waste because of its content of blood, pus or tissue fluids *or* as other hazardous waste because of explicit contamination with Chemotherapy medicine residues, all according to the assessment of the specialist health personnel responsible. When handled as health-care risk waste, Chemotherapy medicine residue must be packed as directed for health-care risk waste.
	Other medical waste.	To be disposed of in it's original packaging or other suitable packaging.	
	Photographic chemicals, other chemicals, mercury residues and suchlike.		
Domestic-type waste and other waste	Drip equipment, ostomy bags, empty urine bags and sanitary towels.	To be handled as domestic-type waste.	Sealed packaging for reasons of hygiene.
	Glass shards, nails, steel wire, and scissors.	Scrap-glass buckets or suchlike.	To be handled separately from the above categories.
	Other waste, the composition of which corresponds to ordinary waste from households, institutions and offices.	To be handled in accordance with municipal Provisional Orders governing the relevant types of waste.	

Summary table for waste schemes

Waste type	**Scope**	**Packaging**	**Carrier and treatment**	**Collection**	**Examples of waste**
Health-care risk waste Tissue waste Hazardous waste	*Waste definitions.* *Waste generators covered by scheme.*	*Requirements on packaging (possibly standard packaging)* *Labelling, colour coding, etc.*	*Name, address, telephone number of carrier,* *treatment plant,* *reception stations for hazardous waste,* *together with the municipal administration.*	*Frequency of collection, possibly with weekday.* *Special requirements on collection, conditions of access, etc.*	*Examples of waste.* *Waste in the "fringe areas".*
Domestic-type waste					

ANNEX C Summary of ADR regulations on infectious substances, including health-care risk waste

The ADR regulations /5/ stipulate rules on the classification, packaging, labelling and transportation of hazardous substances on the highways.

The ADR regulations /5/ stipulate rules on the classification, packaging, labelling and transportation of hazardous substances on roads, also including waste that contains dangerous substances. The ADR Convention applies to international road transport, and since 1 January 1997, also to national road transport, together with the deviations pursuant to Ministry of Transport Statutory Order No. 762, of 20 August 1996, on the transportation of hazardous goods by road. Waste that contains substances classified as dangerous in the context of the ADR is also covered by the ADR regulations.

Class 6.2 of the ADR regulations covers infectious substances and, thus, also waste that contains infectious substances. In the following, there is a brief summary of the ADR regulations on infectious substances, from the standpoints of classification, packaging regulations and requirements on labelling. For more detailed information, see the provisions of the ADR regulations.

The Ministry of Transport is the authority responsible for the ADR regulations. The Ministry of the Interior Emergency Management Agency administers the technical circumstances.

To facilitate references, the ADR regulations include margin numbers. References to these margin numbers can also be found in the following summary.

C1 Classification

The infectious substances classified in Class 6.2 are split into 3 groups, designated "A", "B" and "C", with subordinate points designated "1", "2", "3", "4" and "11". The UN numbers refer to the UN List of Dangerous Substances.

A. Infectious substances of high potential risk.

1: Infectious substances, dangerous to humans (UN No. 2814)

Infectious substances, dangerous only to animals (UN No. 2900)

2: Infectious substances, dangerous to humans (UN No. 2814)
Infectious substances, dangerous only to animals (UN No. 2900)

B. Other infectious substances.

3: Infectious substances, dangerous to humans (UN No. 2814)
Infectious substances, dangerous only to animals (UN No. 2900)

4: Health-care risk waste, unspecified (UN No. 3291)

C. Empty packaging that has contained substances belonging to Class 6.2.

11: Non-cleaned, empty packaging, including empty IBCs *(Intermediate Bulk Containers),* empty tank trucks, empty removable tanks and empty tank containers, which have contained substances belonging to Class 6.2.

Infectious substances are classified under subordinate points 1, 2, 3 and 4, in accordance with the following risk groups, designated I-IV:

IV (high individual risk, high risk to society) covers micro-organisms that can cause serious diseases in humans or animals, that can present a high risk of spreading and for which no effective prophylactics is normally possible. The Ebola virus is an example of a virus belonging to risk group IV. Risk-group IV substances are classified under subordinate point 1;

III (high individual risk, low risk to society) covers micro-organisms that can cause serious diseases in humans or animals, and that can present a high risk of spreading but for which an effective prophylactic method or treatment is normally available. Hepatitis B is an example of a virus belonging to risk group III. Risk-group III substances are classified under subordinate point 2;

II (Moderate individual risk, limited risk to society) covers microorganisms that can cause diseases in humans or animals, but which probably do not spread and for which an effective prophylactic method or treatment is normally available. Several types of Salmonella bacteria belong to risk group II. Risk-group II substances are classified under subordinate point 3;

I (low risk to individuals and society) cover microorganisms that can hardly cause disease in humans or animals. Subordinate

point 4 (clinical waste, unspecified) can encompass substances classified in risk group I.

Apart from health-care risk waste from special laboratories, health-care risk waste will normally contain microorganisms belonging to risk groups I and II. Special laboratories that generate waste containing micro-organisms belonging to risk groups III and IV normally have their own treatment facilities for the waste (deactivation). There is, therefore, only a limited need for transporting health-care risk waste containing microorganisms belonging to risk groups III and IV.

Hypodermic needles, which potentially carry infectious substances belonging to risk groups III and IV, are generated by many sources of health-care risk waste. On condition that the needles are packed in impact-resistant, sealed needle boxes, it is considered that such boxes can be transported in accordance with the rules for subordinate point 3.

C2 Packaging regulations

Only the packaging regulations that apply to subordinate points 3, 4 and 11 (i.e., risk groups I and II) will be discussed in the following. See the ADR regulations, concerning the requirements on subordinate points 1 and 2 (risk groups III and IV).

ADR-compliant packaging also satisfies the conventions on transport by rail (RID), ship (IMDG) and air (ICAO).

C2.1 Packaging regulations for substances belonging to subordinate points 3 and 4 in group B

Substances belonging to subordinate points 3 and 4 must be packed in one of the following types of packaging:

a) Steel drums according to margin No. 3520;
b) Aluminium drums according to margin No. 3521;
c) Steel cans according to margin No. 3522;
d) Plastic drums or plastic cans according to margin No. 3526;
e) Composite packaging (plastic) according to margin No. 3537;
f) Combinations packaging according to margin No. 3538;
g) Composite packaging (glass, porcelain or stoneware) according to margin No. 3539;
h) IBCs of metal according to margin No. 3622;
i) IBCs of stiff plastic according to margin No. 3624;
j) Composite IBCs with internal plastic containers according to margin No. 3625, except for IBCs of types 11HZ2 or 31HZ2.

When transporting health-care risk waste, combination packaging according to margin No. 3538 (f) can be relevant. Combination packaging consists of an internal packaging and an external packaging. The *internal packaging* of combination packaging according to margin No. 3538 includes:

- Glass, porcelain or stoneware with a maximum capacity of 5 litres, for fluids, or 5 kg, for solid substances;
- Plastic packaging with a maximum capacity of 30 litres, for fluids, or 30 kg, for solid substances;
- Metal packaging with a maximum capacity of 40 litres, for fluids, or 40 kg, for solid substances;
- Bags and sacks of paper, textile, woven plastic or plastic sheeting with a maximum capacity of 5 kg (bags) and 50 kg (sacks);
- Cans, folding cartons and boxes of cardboard or plastic with a maximum capacity of 10 kg, for solid substances;
- Other forms of small packaging, e.g., tubes with a maximum capacity of 1 litre, for fluids, or 1 kg, for solid substances;

and as the *external packaging*:

- Steel drums with removable lids (margin No. 3520);
- Aluminium drums with removable lids (margin No. 3521);
- Steel drums with removable lids (margin No. 3522);
- Plywood drums (margin No. 3523);
- Cardboard drums (margin No. 3525);
- Plastic drums with removable lids (margin No. 3526);
- Plastic cans with removable lids (margin No. 3526);
- Boxes made of undressed wood (margin No. 3527);
- Boxes made of plywood (margin No. 3528);
- Boxes made of fibreboard, chipboard or suchlike (margin No. 3529);
- Cardboard boxes (margin No. 3530);
- Plastic boxes (margin No. 3531);
- Boxes made of steel or aluminium (margin No. 3532);

C2.3 Packaging regulations for empty packaging belonging to subordinate point 11 in group C

The requirement on empty, non-cleaned packaging and IBCs belonging to subordinate point 11 in group C is that they shall be as tightly sealed as they were when full.

C2.4 Type approval of packaging

The design of packaging shall be as permitted by the competent national authorities. Moreover, packaging shall satisfy technical specifications and be tested pursuant to the ADR regulations.

Type approval for packaging is carried out by Centre for Packaging and Transport, within the Danish Technological Institute.

C3 Requirements on labelling

The ADR regulations stipulate requirements on labelling of the individual types of packaging, so that it is immediately apparent that packaging has type approval and has been tested in conformity with the ADR regulations. For the detailed rules on the labelling of packaging, see the provisions of the ADR regulations.

External packaging shall be labelled with the waste's UN number (cf. the above UN numbers) and danger label No. 6.2 (black symbol on white ground) shown below.

Depending on the fragility of the internal packaging and lid, the external packaging shall also be labelled with danger label No. 11, which indicates the correct orientation of a package.

Danger label No. 6.2, infectious substances

ANNEX D Waste catalogue codes

The following is a translation of an extract from "Listen over affald" ("The List of Waste").

"Listen over affald" implements the European Waste Catalogue, which was drafted pursuant to Council Directive 75/442/EEC on waste /1/. The list is a non-exhaustive list of waste. The fact that a substance or object is on the list does not mean that the substance or object is waste under all circumstances. It is only a question of waste when the definitions of waste in the Danish EPA statutory order on waste are satisfied; see ref. /4/, Paragraph 3.

Waste catalogue codes (EWCs) that end with the digits "00" are merely headings and shall not be used, for instance, when reporting hazardous waste to the local council or when registering the transportation of hazardous waste. The waste types on the list must not be read outside the context of the section in which they appear.

18 00 00	WASTE FROM PRACTISING DOCTORS AND VETERINARIANS AND/OR ASSOCIATED RESEARCH ACTIVITIES (with the exception of kitchen and canteen waste, which is not directly associated with the treatment of patients)
18 01 00	Waste from maternity wards, diagnoses, treatment or prophylactics of human diseases
18 01 01	Sharp and pricking objects
18 01 02	Body parts and organs (including blood bags and stabilised blood)
18 01 03	Other waste, if its collection and disposal are subject to special requirements due to a risk of infection
18 01 04	Other waste, if its collection and disposal are not subject to special requirements due to a risk of infection (e.g., bandages, plaster casts, linen, disposable clothing, napkins)
18 01 05	Discarded chemicals and medicines
18 01 98	Waste amalgam
18 01 99	Other waste
18 02 00	Waste from research activities, diagnoses, treatment or prophylactics of animal diseases
18 02 01	Sharp and pricking objects
18 02 03	Other waste, if its collection and disposal are subject to special requirements due to a risk of infection
18 02 04	Other waste, if its collection and disposal are not subject to special requirements due to a risk of infection

18 02 05	Discarded chemicals and medicines
18 02 99	Other waste

ANNEX E References

/1/ EEC Directive No. 91/156/EEC on waste.

/2/ EEC Directive No. 91/689/EØF on hazardous waste.

/3/ EU Directive No. 94/67/EF on the incineration of hazardous waste.

/4/ Danish EPA Statutory Order No. 299 on waste, of 30 April 1997.

/5/ The European Agreement concerning International Carriage of Dangerous Goods by Roads. Issued by the UN in 1957, revised 1997 Danish issue published by the Ministry of the Interior Emergency Management Agency.

/6/ Danish EPA Guideline No. 2/1993 on limiting pollution from incinerator plant.

/7/ Danish EPA promulgation of the Environmental Protection Act, No. 625 of 15 July 1997.

/8/ Ministry of Labour Environmental Act, No. 681 of 23 December 1975 with later amendments.

/9/ Ministry of Labour Statutory Order on the performance of work, No. 867 of 13 October 1994.

/10/ Ministry of Labour Statutory Order on the use of technical aids, No. 1109 of 15 December 1992.

/11/ Ministry of Labour Statutory Order on the design of technical aids, No. 561 of 24 June 1994.

/12/ Directorate of Labour Inspection Statutory Order on biological agents and the working environment, No. 864 of 10 November 1993.

/13/ Directorate of Labour Inspection instruction No. 4.9.1.1 on AIDS and the prevention of HIV infection, June 1988.

/14/ Ministry of Health Practice of Medicine Act, No. 426 of 19 August 1976 with later amendments.

/15/ Ministry of Health Nurse Act, No. 759 of 14 November 1990 with later amendments.

/16/ National Board of Health Guideline on the human immune-deficiency virus HIV and the prevention of blood-born infection, October 1992.

/17/ Rutala W.A., Mayhall C.G. Medical Waste. Infect Control Hosp Epid 1992, 13: 38-48.

/18/ Reinhardt PA, Gordon JG. Infectious and medical waste management. USA 1991.

/19/ EU. Analysis of Priority Waste Streams, Healthcare Waste. Information Document Final. October 1993.

/20/ Directorate of Labour Inspection instruction on the working environment, No. 4.1.1.1 for working with Chemotherapy medicine residues. November 1995.

/21/ National Board of Health Statutory Order on the use of open radioactive sources in hospitals, laboratories, etc., No. 485 of 18

November 1985, with the amendments of Statutory Order No. 1135 of 15 December 1992.

/22/ National Board of Health. Guideline on radiation protection when working with open radioactive sources. The National Institute of Radiation Hygiene. 1995

/23/ Risø National Laboratory. Rules for taking over radioactive waste. January 1992.

/24/ National Board of Health Statutory Order on transporting radioactive substance, No. 731 of 27 November 1989.

/25/ Veterinary Department Statutory Order No. 612 of 17 July 1995 the pre-processing of animal waste and on the production of animal feed with animal content.

/26/ Veterinary Department Statutory Order No. 303 of 11 May 1995 on medicines for veterinary use.

/27/ Veterinary Department guideline on medicines for veterinary use. Outdated.

/28/ Danish EPA statutory order package on supplementary rules pursuant to the Act on planning. Statutory Order No. 847 of 30 September 1994.

/29/ Danish EPA Guideline to determining whether a plant or project falls within the scope of the rules on Environmental Impact Assessment (EIA), No. 182 of October 1994.

/30/ Ministry of Labour instruction on assessment of the work place, No. 4.0.0.1, August 1994.

/31/ Ministry of Labour information sheet on assessment of the work place, No. 4.0.0.1, August 1994.

/32/ Directorate of Labour Inspection Circular No. 10, 1990, on the design of waste systems etc.

/33/ Directorate of Labour Inspection Memorandum No. 4.05.2. Assessment of lifting devices. October 1994.

/34/ Ministry of Housing and Urban Affairs. National Building and Housing Agency. Building Regulations.

/35/ Ministry of Transport Statutory Order No. 762 of 20 August 1996 on the transportation by road of hazardous goods.

/36/ Directorate of Labour Inspection Memorandum No. 4.04.18 on working with high-pressure equipment. October 1990.

/38/ Directorate of Labour Inspection Statutory Order No. 746 on personal protective devices and clothing. 28 August 1992, amended 23 March 1994 by Statutory Order No. 186.

/39/ Directorate of Labour Inspection Statutory Order No. 1273 on safety requirements set on protective devices and clothing. 18 December 1996.

/40/ National Serum Institute, The National Centre for Hospital Hygiene. Advice and instructions on precautions concerning isolation and care of patients with infectious diseases. 1996.

/41/ Danish EPA Statutory Order No. 41 of 14 January 1997 on waste incinerator plant.