(ACE Paper 17/2003)

For advice

Waste Disposal (Amendment) Bill 2003
Proposed Waste Disposal (Clinical Waste) (General) Regulation
Proposed Waste Disposal (Charges for Disposal of Clinical Waste) Regulation

Consequential Amendments to the
Waste Disposal (Chemical Waste) (General) Regulation (Cap. 354C)
and
Waste Disposal (Permits and Licences) (Forms and Fees) Regulation (Cap. 354D)

Problem

We need to tackle the following problems to protect Hong Kong's interest and our public health:

a) the lack of control over the handling, collection and disposal of clinical waste, which exposes the public and waste collection personnel to potential health risks;

b) the current exemption from permit requirement in regard to the import of recyclable waste provides opportunities for exploitation which in turn may lead to the disposal of such waste in Hong Kong; and

c) the absence of legal backing to our commitment to the international ban prohibiting the export of hazardous waste from developed countries (known as the "Basel Ban").

Background

2. We consulted this Council in March 1999 on the Waste Disposal (Amendment)

Bill 1999. The relevant ACE Paper 10/99 is at **Annex 1**. Members supported the proposals at the meeting. In that submission, we proposed that the Clinical Waste Control Scheme (the Control Scheme) be applied to major waste producers only i.e. hospitals and Government clinics, and that small waste producers would be subject to control only if self-regulation failed.

3. To offer the community good safeguard against the health risks associated with the improper handling of clinical waste, we had reconsidered the scope of the Control Scheme and we subsequently proposed a more robust Scheme under which all waste producers would be subject to legal control. We consulted this Council in April 2002 and received Members' general support to the revised Control Scheme. The relevant ACE Paper 12/2002 is at **Annex 2** There has been no change to our proposal. This paper aims to set out how the Clinical Waste Control Scheme and other waste management initiatives will be reflected in the proposed legislations.

Control of clinical waste

4. Clinical waste is potentially infectious and biohazardous, and if not properly handled will pose serious health risks. To protect public health, we propose to implement a Clinical Waste Control Scheme by:

a) establishing a statutory licensing framework for all clinical waste collectors;

b) requiring clinical waste producers to properly manage their clinical waste by segregating those waste from other municipal solid waste and consigning the clinical waste to licensed clinical waste collectors for disposal. Healthcare professionals will be exempted from licensing and can deliver not more than 5 kg of clinical waste to a licenced disposal facility or an authorized collection point set up by waste collectors or individual waste producers[1];

[1] These requirements will be set out in the proposed Waste Disposal (Clinical Waste) (General) Regulation. The Regulation will also stipulate that healthcare professionals mean registered medical practitioners, registered dentists, registered veterinary surgeons, registered/listed Chinese medicine practitioners and registered/enrolled nurses as defined in the relevant legislation.

c) promulgating Codes of Practice to provide guidance for major clinical waste producers (i.e. hospitals), waste collectors and small waste producers (i.e. clinics and medical laboratories etc) on segregation, packaging, labelling, collection, storage, transportation and disposal of clinical waste;

d) setting up a trip-ticket system to track clinical waste from source to disposal facility; and

e) designating the Chemical Waste Treatment Centre (CWTC) as the facility to treat clinical waste and levying a disposal charge on clinical waste producers for use of the facility.

5. The Waste Disposal Ordinance (the Ordinance) will define clinical waste and provide for licensing control on clinical waste collectors. Details of the Control Scheme will be set out in the proposed Waste Disposal (Clinical Waste) (General) Regulation and the Codes of Practice.

6. We propose to utilize the CWTC to treat clinical waste. An Environmental Impact Assessment Study had been carried out in 1998-9 and concluded that the CWTC was suitable to treat clinical waste in an environmentally acceptable manner. This Council endorsed the Study report in May 1999.

7. At present, all clinical waste are separated from other waste and are disposed of in special trenches at landfills. While this is a safe and proper disposal method for clinical waste, high-temperature incineration is the best guarantee for all pathogens to be destroyed. We have examined other treatment methods[2] but decided against them because they are either not proven or unreliable, or there is not yet any international control parameter.

8. In accordance with the User Pays Principle, we propose to levy a charge for the reception and treatment of clinical waste at the CWTC. The charge will be prescribed in the proposed Waste Disposal (Charges for Disposal of Clinical Waste) Regulation. Having regard to the current level of charges for chemical waste and our assessment of acceptance by the affected trades, we propose to set the charge at the same level currently applied to

[2] We have examined treatment methods like autoclaving, microwaving, chemical disinfection, gasification, pyrolysis, plasma and irradiation etc.

chemical waste i.e. to recover 31% of the variable operation cost[3] of CWTC. The charge will be raised incrementally with a view to eventually recovering in full the variable operation cost for treating clinical waste at the CWTC.

9. Our current estimate of the variable operation cost of treating clinical waste at the CWTC is $7,700 per tonne at March 2003 prices. The exact cost will be determined after the CWTC contractor has submitted a formal tender bid and the tender process has been approved. Based on a recovery rate of 31% of the variable operation cost, the charge will be around $2,387 per tonne, or $2.38 per kilogram of clinical waste.

Disposal of imported non-hazardous waste

10. At present, under the Ordinance, import of non-hazardous waste requires a permit from the Director of Environmental Protection (DEP)[4]. The only exception is importation for recycling purpose as the international trend is to encourage free trade of non-hazardous waste which in turn would be conducive to promoting recycling. However, it is possible that these imported waste would ultimately be disposed of in Hong Kong, either because the original arrangement for recycling has fallen through, or the importer has purposely imported the waste under the disguise of recycling, when his real motive is to dispose of the waste in Hong Kong. Prosecution has been extremely difficult as Government needs to establish the offender's intent to deceive at the time of importation[5].

11. To plug this loophole and conserve our valuable landfill space, we propose to make it an offence for a person to dispose of imported non-hazardous waste without prior authorization from DEP, which will only be granted if the applicant can prove that he has exhausted all possible recycling outlets and all means to return his waste to the place of origin. The need to prove the offender's earlier intent to deceive would not be required. The applicant will be required to pay the full disposal cost involved.

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[3] The cost for operating the CWTC comprises a minimum operating charge and a set of variable operating charges. The former is a fixed minimum payment irrespective of the amount of waste handled by the facility whereas the latter are the unit charges for treating different types of waste.

[4] Normally, DEP will not issue a permit for the importation of non-hazardous waste for the purpose of disposal in Hong Kong.

[5] In the past three years, there are on average over 30 cases of identified attempts to dispose of imported non-hazardous waste in Hong Kong. The amounts of waste involved each year ranged from 130 tonnes to 470 tonnes. On average, there are only 6 successful prosecution cases each year.

Basel Ban

12. In 1995, the parties to the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal[6] agreed to ban the export of hazardous waste from state-members of the Organization for Economic Cooperation and Development, European Community and Liechtenstein to other states (known as the Basel Ban). The objective is to reduce the environmental impact caused by the movement of hazardous waste from developed countries to developing countries.

13. The People's Republic of China is a Party to the Basel Convention. Since 1998, DEP has been implementing the Basel Ban in Hong Kong administratively by exercising his power to approve or refuse the issue of permits for the importation of waste. We now propose to set out the Basel Ban in clear terms in the Ordinance. This would send a strong signal to the international community regarding Hong Kong's commitment to enforcing the Ban.

Miscellaneous amendments to the ordinance

14. We propose to take this opportunity to make some miscellaneous amendments to the Ordinance so as to increase the transparency of the law and further streamline enforcement operations. The key provisions include –

(a) setting out the conditions that DEP may prescribe for waste collection and disposal licences in two new Schedules to the Ordinance. This will enable applicants to know beforehand the likely conditions that may be imposed on these licences; and

(b) replacing the prescribed forms for the application of a waste collection licence and waste disposal licence with forms specified by DEP. This would allow DEP more flexibility in amending the application forms.

Other miscellaneous amendments

[6] The Convention was adopted in Basel, Switzerland in March 1989 and came into force in May 1992. It aims to define global means to control the movement of hazardous waste, minimise their production and ensure that these waste are disposed of in an environmentally sound manner. At present, there are 156 parties to the Convention.

Waste Disposal (Chemical Waste) (General) Regulation (Cap. 354C)

15. The present legislative proposals also contain a technical amendment to section 20 of the Waste Disposal (Chemical Waste) (General) Regulation, which is related to DEP's power to issue trip tickets. At present, the Chinese text for "issue" is "簽發". We propose to substitute "發出" for "簽發" to better reflect the fact that DEP would not need to sign the trip tickets before issuing them to waste collectors and waste producers. The English text will remain unchanged.

Waste Disposal (Permits and Licences) (Forms and Fees) Regulation (Cap. 354D)

16. Following our proposal to replace the prescribed forms for the application of a waste collection licence and waste disposal licence with forms specified by DEP (see para 14(b) above), the application forms currently prescribed in the Waste Disposal (Permits and Licences) (Forms and Fees) Regulation would need to be repealed.

Public consultation

17. The LegCo Environmental Affairs and Health Services Panels were consulted on the proposed Control Scheme and the plan to utilize the CWTC for treatment of clinical waste in March and May 2002. The joint Panels had no objection to the proposals.

18. In 1999, the Advisory Council on the Environment examined the Environmental Impact Assessment Study Report which concluded that CWTC was able to treat clinical waste in an environmentally acceptable manner. This Council endorsed the Report. In April 2002, we further consulted this Council on the proposed Control Scheme and received Members' support to the proposal.

19. In November 2001, we issued a Consultation Document on the proposed Control Scheme to the medical, Chinese medical, dental, nursing and veterinary sectors, green groups, academic institutions, waste collectors and other related organizations. We also attended eight meetings and discussion forums to explain the proposed Control Scheme to the parties concerned. Except for Greenpeace and the Kwai Tsing District Council, respondents to the Consultation Document generally supported the proposal.

20. We consulted the shipping industry and other stakeholders on the proposal to control the disposal of imported waste in May 1999. Respondents either supported or had no comments on the proposal. As there has not been any change to this particular proposal since then, and given the limited impact the proposal has on the concerned industries, we believe that further consultation would not be necessary.

21. DEP has been implementing the Basel Ban administratively since December 1998. The relevant arrangements have been made known to both local and overseas traders prior to the implementation.

Legislative timeable

22. We plan to introduce the Waste Disposal (Amendment) Bill 2003 to the Legislative Council in late June 2003. Upon enactment of the Bill, the proposed Waste Disposal (Clinical Waste) (General) Regulation and the proposed Waste Disposal (Charges for Disposal of Clinical Waste) Regulation will be introduced. Our plan is to implement the Control Scheme in 2004.

Advice sought

23. Members are invited to comment on the legislative proposals set out in the paper.

Environment, Transport and Works Bureau
June 2003

Annex 1

ACE Paper 10/99

For advice

Amendment to the Waste Disposal Ordinance

PURPOSE

This paper seeks Members' views on the proposals to amend the Waste Disposal Ordinance (WDO), Cap 354 to:

- control disposal of non-hazardous waste imported from outside Hong Kong;
- give legislative effect to the "Basel Ban";
- provide a legislative framework for the introduction of the Clinical Waste Control Scheme; and
- introduce minor amendments to tidy-up the Ordinance.

BACKGROUND

Waste Disposal Ordinance (Cap 354)

2. The WDO was enacted in 1980 to provide for the control and regulation of the production, storage, collection and disposal of waste (including treatment, reprocessing and recycling). It also covers the licensing of places and persons connected with such activities, and the protection and safety of the public in relation to any such activities. The Ordinance was later expanded to control livestock waste and chemical waste, and to give effect to the *Basel Convention on the Control of Trans-boundary Movements of Hazardous Wastes and Their Disposal* (Basel Convention) relating to the control of movement of waste into and out of Hong Kong.

Disposal of Imported Waste

3. In January 1998, Members were informed of the background and Hong Kong's position on the control on import and export of waste. There is concern about the potential adverse impacts of non-recyclable or hazardous waste. This led to the conclusion of an international agreement, known as the Basel Convention on the Control of Trans-boundary Movements of Hazardous Wastes and their Disposal, which provides a framework for controlling the trans-boundary movement of hazardous and other wastes. The main control mechanism is to effect a system of prior notification and consent by the authorities of the states of import, export and transit prior to the commencement of shipments of hazardous or non-recyclable waste. This Convention

is given effect in Hong Kong under the WDO. The import and export of non-hazardous waste (waste as listed in the Sixth Schedule and uncontaminated) for the purpose of recycling or reuse in Hong Kong or for re-export to other places (e.g. mainland China), is currently not restricted.

4. A small number of problems have been experienced when non-hazardous waste was imported into Hong Kong with the intention of re-export or transshipment for recycling elsewhere. In some cases, subsequent to the import, the commercial arrangement fell through. If there is a deviation from the original intention at the time of import (e.g. the waste is rejected by its intended destination for whatever reason), the waste may be returned to, or stranded in, Hong Kong. The owner may then try to dispose of the waste at the local landfills if this is more convenient and cheaper than the other options available to him.

5. Allowing local disposal of these imported wastes uncontrolled is inconsistent with waste management policy. The imported waste should be reused, recycled or returned to the original state of export as far as practicable. Indiscriminate disposal of waste imported allegedly for the purpose of reuse or recycling must be prevented. Under the existing system, it is often difficult to prosecute successfully. In the past few cases, legal advice was that, at the time of import, the waste owners did not have the mens rea (the guilty intent) to commit the offence of importing for the purpose of disposal. Prosecutions could not be brought.

6. To close this loophole, it is proposed that importers or owners of any imported non-hazardous waste must obtain an authorization from the Director of Environmental Protection (DEP) before they can dispose of waste at any local waste disposal facilities. Authorization may be granted to an importer or owner if the importer or owner can prove that it is impractical to:

- return the waste to the country of export; and

- that he has explored but been unsuccessful in identifying other outlets to reuse, reprocess or recycle the waste in a manner acceptable to DEP.

7. It must be stressed that this is a last resort situation, to be exercised only in extreme and unusual circumstances. Hong Kong will not be allowed to become an outlet for dumping international waste. Furthermore, the importer or owner must pay a charge specified by DEP in order to recover the full disposal cost.

Basel Ban

8. In 1995, the Third Conference of Parties of the Basel Convention agreed to ban the export of hazardous waste from States which are members of OECD, EC and Liechtenstein, to other States. The objective is to reduce the environmental impacts caused by the movement of hazardous waste from developed countries to developing countries. A list of the developed countries is at Appendix. This is commonly known as the "Basel Ban". This ban has already been implemented administratively with effect from 28 December 1998. DEP, by referring to the power under s.20A(3) of the WDO, would refuse giving pre-shipment approval to applications from the countries in question. It is now intended to formalize the arrangement through legislative amendment.

Control of Clinical Waste

9. At the EA Panel Meeting on 20 February 1998, proposals for a clinical waste control scheme (CWCS) and incineration of clinical waste in the Chemical Waste Treatment Centre was discussed. Members noted that clinical waste is potentially infectious and bio-hazardous and need to be disposed of in an environmentally sound way. Even for clinical waste of relatively low risk, it may be aesthetically offensive by nature and require careful treatment as part of the overall waste management strategy. Clinical waste disposal needs to be subject to control, not only because of the inherent risks they pose, but also because of legitimate public concerns, and the occupational safety of waste collectors and waste disposal staff, who may come into contact with these wastes.

10. The proposed control strategy is as follows:

- Control will be implemented in two phases. In the first phase, public and private hospitals and government clinics will be subject to control. We intend to extend the control scheme to the remaining small clinical waste producers in the second phase.

- Clinical waste collectors and transporters will be required to meet the legislative requirements prescribed in subsidiary legislation. Clinical waste disposal operations will be controlled by licences.

- A Code of Practice detailing the operating standards will be drafted to provide guidance to all clinical waste producers as well as collection and disposal contractors to ensure that the entire disposal operation will not pose health hazards to the workers and the public.

11. Whilst the details will be set out in subsidiary legislation, suitable provisions need to be put into the principal Ordinance. These include:

(a) defining clinical waste;

(b) providing for introducing licensing control on the operation of clinical waste disposal facilities and specifying technical and training requirement for collectors and transporters of clinical waste;

(c) providing for the Chief Executive in Council to make subsidiary regulations relating to the CWCS; and

(d) empowering DEP to implement the CWCS by phases by bringing relevant sections in effect.

12. Members will be consulted again on the detailed aspects of implementing the CWCS.

Miscellaneous Amendments

13. The opportunity is also being taken to introduce other miscellaneous amendments to the WDO to strengthen the powers and to streamline the enforcement operations. These include:

(a) enabling the Secretary for Planning, Environment and Lands to amend the Schedule in the Waste Disposal (Designated Waste Disposal Facility) Regulation (Cap. 354, Sub. Leg.) by notice published in the Gazette. This will facilitate regular updating of the list of designated waste disposal facilities as a number of new waste disposal facilities will either come into operation or be decommissioned in the next few years;

(b) enabling DEP to accept or reject any waste types at any waste disposal facilities designated in the schedule to the Waste Disposal (Designated Waste Disposal Facility) Regulation. This is necessary in order to maintain proper management of such facilities;

(c) repealing the requirement of dividing a legal sample of waste into three parts during law enforcement operations,. The samples are currently kept by Government Chemist (for analysis) and by Environmental Protection Department (EPD) and the party under investigation (the person-in-charge). The latter two parts are not subject to preservation measures and there is no means to prevent tampering with such samples. The analysis of these samples is unreliable and would not be admissible in court; and

(d) repealing section 16(4) of WDO (under which disposal of waste, other than chemical waste, on unleased land is not subject to a license) so that disposal of waste in any facilities on unleased land will be made subject to licensing control by DEP under s.16. This will ensure consistency in regulatory control on Government as well as private land.

Legislative Timetable

14. It is planned to introduce the Waste Disposal (Amendment) Bill for First and Second Reading in June 1999. Upon the enactment of the Bill, the necessary subsidiary legislation to implement the CWCS will be introduced.

Publicity and Public Consultation

15. Extensive consultation has been conducted with the medical profession on the proposed CWCS. Groups consulted include the Hospital Authority, private hospitals, the Hong Kong Medical Association, Estate Doctors Association and Environmental Contractors Management Association. Representatives generally supported the CWCS, and have raised useful technical comments. They have also raised concerns over the level of charging should the waste be disposed of in designated facilities. These views will be taken into account in drawing up the necessary subsidiary legislation and the code of practice.

16. EPD has also introduced administrative measures to implement the Basel Ban in December 1998. Relevant sectors, including the recycling trade, shipping companies and trade associations have been notified. The proposed legislative amendment will formalize the present arrangements. All relevant sectors are being informed of the proposal to tighten control on the disposal of imported non-hazardous waste.

ADVICE SOUGHT

17. Members are invited to comment on the various amendment proposals set out in the paper.

Planning, Environment and Lands Bureau
February 1999

Appendix

States Included in Annex VII of the Basel Convention

Australia
Austria
Belgium
Canada
Czech Republic
Denmark
Finland
France
Germany
Greece
Hungary
Iceland
Ireland
Italy
Japan
South Korea
Liechtenstein
Luxembourg
Mexico
The Netherlands
New Zealand
Norway
Poland
Portugal
Spain
Sweden
Switzerland
Turkey
United Kingdom
United States of America

Annex 2

(ACE Paper 12/2002)

For discussion

Proposed Clinical Waste Control Scheme

Purpose

This paper seeks Members' views on a revised proposal for the control of the collection and disposal of clinical waste.

Background

2. Clinical waste is waste arising from practice or research for dental, medical, nursing, veterinary, pathological/laboratory testing or pharmaceutical purposes. It includes mainly used or contaminated sharps like syringes/needles, laboratory wastes, human and animal tissues/organs, infectious materials from patients, and surgical dressings. We estimate that about eight tonnes of clinical waste are currently produced every day, largely in hospitals, clinics, and medical laboratories.

3. Clinical waste is potentially dangerous since some may carry infectious disease, and sharps like needles and scalpels may cause injury. Many private clinics and medical laboratories are located in residential and commercial establishments. Hence, waste collectors and the public may inadvertently come into contact with clinical waste. At present, the Government has no special requirement for the collection and disposal of clinical waste. Most clinical waste is disposed of in landfills without treatment.

4. To safeguard public health and safety, we introduced in 1997 a proposed Clinical Waste Control Scheme (the Control Scheme) to control the handling, collection and disposal of clinical waste for consultation with stakeholders, this Council and the LegCo Environmental Affairs / Health Services Panels. Under this Control Scheme, it was proposed that:

(a) legislative control on major clinical waste producers (i.e. hospitals, maternity homes and Government clinics) should be the first step to tackle the issue;

(b) legislative control on small clinical waste producers (such as private medical, dental and veterinary clinics and laboratories) could be held in abeyance if these producers can demonstrate a satisfactory level of control through self-regulation; and

(c) the collected clinical waste should be disposed of at the Chemical Waste Treatment Center (CWTC) at Tsing Yi.

5. An Environmental Impact Assessment (EIA) was completed and concluded that the CWTC is suitable for treating clinical waste in an environmentally acceptable manner. This Council endorsed the EIA report in May 1999 (para 18 below). The Legislative Council, in examining the disposal issue, requested us to provide more information on alternative technologies for clinical waste treatment.

6. Consequently, the Environmental Protection Department (EPD) engaged Mr. William K. Townend[7], an international expert on clinical waste management, to study available treatment technologies worldwide, review international practices, and advise on the application of such technologies in Hong Kong. At the same time, in view of increasing public concern over the potential risks associated with improper handling of clinical waste, we also reviewed the proposed two-phase approach regarding the control of clinical waste collection.

Revised Proposal for Handling and Collection of Clinical Waste

7. We completed the review on clinical waste collection in 2001. To better safeguard public health and safety, we propose to adopt a more robust collection system which would extend legal control to all major and small clinical waste producers simultaneously, requiring them to segregate properly clinical waste from other wastes, and arrange for proper disposal of the waste.

The Revised Control Scheme

8. The revised Control Scheme comprises the following key elements:

[7] Mr Townend was the former President of the Institute of Waste Management in the United Kingdom and the current Chairman of the Working Group on Health Care Waste of the International Solid Waste Association. He has been a consultant and adviser to the World Health Organisation (WHO), and is also the co-author of the WHO publication "Teacher's Guide – Management of Wastes from Health-care Activities".

(a) establishing a statutory licensing framework to regulate the handling of clinical waste by collectors and disposal facility operator(s);

(b) requiring clinical waste producers to consign their waste to licensed clinical waste collectors. Alternatively, healthcare professionals should deliver not more than 5 kilograms of clinical waste to the disposal facility or authorized collection points set up by waste collectors or individual waste producers;

(c) issuing two codes of practice - one for waste collectors and major clinical waste producers, and one for small waste producers - to provide guidance on segregation, packaging, labelling, collection, handling, storage, transportation and disposal of clinical waste;

(d) putting in place a trip ticket system to track the movement of clinical waste from its source to the disposal facility; and

(e) requiring clinical waste producers to pay a charge to cover part of the waste disposal cost.

Consultation with Relevant Sectors

9. In November 2001, we issued a Consultation Document on the revised Control Scheme together with a draft "Code of Practice for the Management of Clinical Waste for Small Clinical Waste Producers" (Annex A) for consultation with stakeholders, including the medical, Chinese medical, dental, nursing and veterinary sectors, elderly homes, green groups, academic institutions, waste collectors and other related organizations. We also attended eight meetings or discussion forums[2] to explain the revised Control Scheme to the parties concerned and to collect their views.

Annex A not included

10. We received 27 written submissions at the end of the consultation period. The submissions show general support for the revised Control Scheme. A summary of the comments received and our response to the comments is at Annex B. Major issues raised in the written submissions and in meetings with the relevant trades include:

Annex B not included

(a) Level of collection charges

Some small waste producers are concerned about the level of collection

charges to be levied by waste collectors and suggested that Government should subsidize the cost, or regulate future fee increases. At present, there are already nine collectors providing collection service[3]. We believe this number should allow sufficient competition in a free market and help ensure that the collection cost is kept at a reasonable level. In addition, we have included in the revised Control Scheme some flexibility that allows small waste producers to deliver their clinical waste to authorised collection points or to the disposal facility if they do not wish to hire collectors (para. 8(b) above).

(b) Disposal cost at the waste disposal facility

There are concerns over the proposal to charge waste producers the waste disposal cost, and how future increases would be controlled. Some respondents suggested that such a fee should be waived. We do not agree with this view. We consider that the User Pays Principle should apply and there is no reason for taxpayers to bear the disposal cost for waste producers. We estimate that a small clinic producing 0.4 kg of clinical waste a day would pay less than $35 for disposal each month. Moreover, we believe the disposal cost would help create an economic incentive for waste reduction and proper segregation by clinical waste producers.

(c) Establishing collection points

Some respondents suggested Government set up collection points at Government clinics or public hospitals to serve the small waste producers. As there are already a number of clinical waste collectors in the market, we do not think Government should provide this service. Furthermore, the public should not bear the collection cost nor should Government compete with private waste collectors.

11. There is no change to the control on major waste producers. A copy of the draft Code of Practice applicable to them is at Annex C. Annex C not included

Treatment of Clinical Waste

12. Mr. Townend has already completed the review of treatment technologies. The study report, together with reviews carried out by the Hospital Authority and relevant information gathered by EPD, is at Annex D. Annex D not included

Findings of the Review

13. The review has examined the following technologies for the treatment of clinical waste:

(a) chemical disinfection;

(b) thermal disinfection – wet thermal treatment (autoclave), dry thermal treatment (hot screw-feed technology) and electromagnetic wave treatment (microwave & radio wave);

(c) thermal treatment – incineration, pyrolysis and gasification which operate on a similar principle but use different levels of oxygen in the process; and

(d) novel treatment technologies – plasma based systems and irradiation.

14. In comparing the various treatment technologies, the review has taken into account their health, safety and environmental impacts, efficacies in killing infectious microorganisms, reliability and ease of maintenance, weight and volume reduction of waste, handling of residues and further treatment requirements, space requirements, public perception of risk, as well as their costs and financial implications. In brief, the findings are as follows:

(a) Chemical Disinfection

- Chemical disinfection involves the addition of chemicals to the clinical waste to kill or inactivate the pathogens. Pre-treatment shredding of the waste is required to ensure maximum contact of the chemical with the waste.

- This is a relatively economical means to treat clinical waste.

- However, it introduces an additional chemical burden on the environment. The use of chemicals and the operation of the pre-treatment shredder may pose occupational safety hazards to workers who operate the system. It cannot destroy the residual hazardous chemicals in the clinical waste. It is also not suitable for treating cytotoxic drugs, human tissue and body parts, pharmaceuticals and chemicals.

(b) Autoclaving

- Autoclaving is a wet thermal treatment process that involves the use of steam to sterilize the waste at 121℃-131℃. Pre-treatment shredding of the waste is normally required, or else there could be cold spots where the steam could not reach. The steamed waste is then incinerated or landfilled.

- It is a relatively cheap treatment method and may be operated in hospitals.

- However, vapour will be formed during the process, and residual chemicals in the waste that cannot be destroyed under low temperature would be vaporized and escape into the environment. The emissions, the presence of cold spots and the need for shredding all pose occupational safety hazards to workers who operate the system. It is not suitable for treating cytotoxic drugs, human tissue and body parts, pharmaceuticals and chemicals.

(c) Screw-feeding

- This is a dry thermal treatment process where the waste is heated by a rotating auger to 100℃-131℃. Pre-treatment shredding is required. The residues are then incinerated or landfilled.

- It has the same drawback and inadequacies as autoclaves. Similar to autoclaving, the need for shredding poses occupational safety hazards to workers who operate the system. It is not suitable for treating cytotoxic drugs, human tissue and body parts, pharmaceuticals and chemicals.

(d) Microwaving & Radiowaving

- This is an electromagnetic wave thermal disinfection process that involves the use of high-intensity radiation to heat the moisture inside the waste. The treated waste is then incinerated or landfilled. Pre-treatment shredding is required.

- Both maintenance of the shredder and the exposure to high intensity electromagnetic wave radiation may pose occupational safety hazards to workers who operate the system. Moreover, similar to autoclaving, vapour will be formed during the process,

and residual chemicals in the clinical waste that cannot be destroyed under low temperature would be vaporized and escape into the environment. Again, it is not suitable for treating cytotoxic drugs, human tissue and body parts, pharmaceuticals and chemicals.

(e) Incineration

- This involves burning of waste at over 1200 ℃.

- The process can destroy all types of infectious microorganisms, sharps, cytotoxic drugs, chemicals and toxic volatile compounds. Residual hazardous chemicals in the waste can be destroyed and waste can also be made unrecognizable. The volume and weight of waste can be reduced by over 80% without shredding, and the residual ashes can be disposed of in landfills.

- Pollutants like dioxins will be generated and pollution control devices are required. Both fly ash and bottom ash will be generated. They need to be stabilized and disposed of at landfills.

(f) Pyrolysis

- Pyrolysis is the process of chemical decomposition of organic materials by heat (up to 2500 ℃) in the absence of oxygen.

- The process can significantly reduce the volume and weight of clinical waste and can destroy all infectious micro-organisms and residual amount of cytotoxic drugs, pharmaceuticals and toxic chemicals effectively.

- Similar to incineration, there may be dioxin emission and pollution control devices are required. There is currently only one clinical waste pyrolysis plant in Europe, and it also has an "after-burn" unit i.e. a post-pyrolytic treatment incinerator.

(g) Gasification

- Gasification is a process where the materials (that have a high carbon content) are heated to about 1300 ℃ with a limited amount of oxygen.

- Similar to incineration and pyrolysis, this technology can destroy all micro-organisms, cytotoxic drugs, pharmaceuticals and toxic chemicals effectively. Waste volume and weight can also be significantly reduced.

- Similar to incineration and pyrolysis, there may be dioxin emission and pollution control devices are required. Again, most gasification plants consist of after-burn units to incinerate the residual waste.

(h) Plasma-based Systems & Irradiation

- Plasma-based systems use high temperature (as high as 10,000℃) ionised gas to convert waste to a vitrified substance with separation of molten metal. Irradiation is the use of electron beam or other high energy particles emitted from radioisotopes to disinfect waste.

- Both technologies may kill all microorganisms and make clinical waste unrecognizable. Plasma systems can also significantly reduce the volume and weight of clinical waste.

- However, these are relatively new technologies and there is insufficient information for us to assess the cost and the long-term environmental impacts. They also have a limited proven track record to demonstrate their operational reliability. In cases where the use of radioisotopes is involved, radioactive waste may be generated.

Recommendation on Treatment Technology

15. The review has concluded that technologies described in para 14(a)-(d) are not satisfactory as they cannot properly handle all kinds of clinical waste. These technologies require post-treatment landfilling or incineration and are thus not a total solution in handling clinical waste. Most of them also emit pollutants because they cannot treat the residual chemicals in the waste. Occupational hazards remain a primary concern as there are already cases elsewhere where workers who operate these treatment facilities contract infectious disease. Plasma-based systems and irradiation (para 14(h)) do not pose such problems but they are

relatively new and their operational reliability and environmental impacts have yet to be fully established.

16. As for gasification and pyrolysis (para 14(f) & (g)), Mr Townend is of the view that they do not have specific advantages over incineration, as they do have the same emission problems as incineration. These are new technologies, and there are only a few gasification/pyrolysis plants in operation overseas. Furthermore, incineration is still needed as part of the treatment process. Given that the CWTC is already an existing facility, using incineration to treat clinical waste would obviate the need to build a new facility. Incineration has been developed for many decades and its impacts have been widely studied. With advancement in incineration and pollution control technologies, its environmental impacts including emission of dioxins can be tackled effectively. It remains the most commonly adopted method in treating clinical waste in most advanced economies including the Mainland, the US, Europe, Canada, Australia and Japan.

17. The review recommends that as a medium-term solution, the CWTC, which still has spare capacity, be modified for treating clinical waste. The review suggests that, in the longer term, the Government should keep abreast of international developments and should not preclude the option of installing an alternative treatment facility at a later stage.

Proposed Way Forward

18. Having taken into account the review findings, we consider that we should proceed with the planned modification of the CWTC to treat clinical waste. As mentioned in para 5 above, an EIA on the proposed use of the CWTC for this purpose had been completed in 1999. The findings confirmed that the CWTC, which is a purpose-built waste treatment facility with suitable pollution control devices, is suitable to treat clinical waste in an environmentally acceptable manner. A very tight emission monitoring programme has also been put in place since the CWTC's commissioning. This Council endorsed the EIA report in May 1999 with the following conditions:

(a) stringent requirements on mercury monitoring must be included as part of the environmental monitoring and audit programme of the CWTC;

(b) performance test must be undertaken before the full operation of the clinical waste handling facilities at CWTC; and

(c) the ACE would be informed of any serious problems arising from the performance test or operation.

All findings and recommendations of the EIA report will be adopted, and the conditions set down by this Council will be met.

Legislative and Implementation Timetable

19. We plan to submit the Waste Disposal (Amendment) Bill and the draft Waste Disposal (Clinical Waste) (General) Regulation to the Legislative Council later this year. Subject to the enactment of the Bill and the Regulation, we will implement the revised Control Scheme in 2004.

Resource Implications

20. We plan to seek funding approval from the Legislative Council later this year for the modification of CWTC to treat clinical waste. The capital cost of the modification work is estimated to be $51 million at September 2001 prices. The work is expected to be completed in 2004. The annual recurrent cost for treating clinical waste is estimated to be around $22 million.

21. We intend to recover part of the recurrent cost from clinical waste producers through disposal charges. We propose that the charging mechanism follow that of land-based chemical waste treatment at the CWTC i.e. we will recover 31% of the variable operating cost as a start, gradually raising it to full recovery of the variable operating cost. The capital and fixed operating cost will not be charged. At present, the variable operating cost for the CWTC to treat clinical waste is estimated to be $7.7 per kg. This means a charge of less than $3 per kg, or less than $35 each month for an average clinic that produces 0.4 kg of clinical waste each day (para 10(b)).

Advice Sought

22. Members are invited to comment on the revised Clinical Waste Control Scheme as set out in this paper.

Environment and Food Bureau
Environmental Protection Department
March 2002