Environmental Assessment

GUYANA: HIV/AIDS PREVENTION & CONTROL PROJECT

Bio-Medical Waste Management and Social Assessments

Bio-Medical Waste Management

Background

Method. To assess Health Care Waste Management (HCWM) in Guyana and recommend a HCWM plan to help implement and enforce proper health and environmentally sound, technically feasible, economically viable, and socially acceptable systems for management of health care waste in Guyana, an assessment was conducted as part of the preparation of the proposed project.

Existing data and information on the general characteristics of health care waste management system in Guyana, and the institutional, legal and regulatory health care system framework, were reviewed and analyzed. Problem and alternative solutions were identified. The Sectoral Analysis of Solid Waste in Guyana (MOH, PAHO/WHO, 2003) was used as an important source for this study.

Interviews and field visits

In order to gather relevant information and assess health care waste management in different locations of Guyana, interviews and field visits were carried out, as follows:

a) Georgetown

i. Mayor and City Council. Municipality of Georgetown
Dr. Rufus Lewis. Solid Waste Management Department.
Dr. Vibart Shury. Medical Health Officer.
ii. Guyana Solid Waste Management Association, Mr. Maurice Walker. Vice-President.
iii. Prasad Medical Centre & Medical Arts (Private)
iv. Lodge Health Centre, Ms. Veronica Rodrigues Douglas. Public Health Nurse (PHN).
v. David Rose Health Centre, Ms. Farley Morite (PHN)
vi. Agricola Health Centre, Ms. Jasmin Jones. "Medex"
vii. Campbellville Health Centre
viii. Georgetown Public Hospital Corporation, Mr. Palmanana Samaroo. Director. Facilities Management.
ix. Mandela Landfill
x. Georgetown Incinerator
xi. St. Joseph's Mercy Hospital (private non profit hospital), Sister Sheila Walsh
xii. Woodlands Medical Centre (private)
Dr. Gobins. General Manager
Ms. Sharon Ramdin. Personnel Administrator

b) Region 2. Essequibo

i. Public Health Department, Ms. Shaleena Jaigabind. EHO.
ii. Suddie Regional Hospital, Mr. Haringe Narayan. Administrator and Mayor of the local NDC.
iii. Charity District Hospital, - Ms. Desrii Sanpsom. SM. (Nurse).

c) Linden Complex

i. Mckenzie Regional Hospital, Matron Ms. Liverpool, Mr. Trevor Vangenderen. Administrator

ii. Wismar District Hospital, Sister Debra George (acting supervisor)

d) **Region 5**
   i. Fort Wellington District Hospital
   ii. Rosignol Health Centre
   iii. Ithaca Health Centre

e) **Region 6**
   i. New Amsterdam Regional Hospital
   ii. Skeldon District Hospital, Dr. Jadinauth Raghunauth

f) **West Demerara Regional Hospital**

- Dr. Holly Alexander. RHO
- Ms. Desiree Amsterdam. H.A. WDRH.

Data processing and reporting

Collected field work information was processed and a meeting with counterparts of MOH and PAHO was carried out in Guyana to present the findings and to receive feedback.

Results

Hospital solid waste (HSW) varies in quantity and quality according to the size of a particular health facility and the services it provides. HSW is normally classified according to its level of potential contamination. A simple classification, that is nevertheless generally accepted in developing countries, includes only three types: i) common or general; ii) infectious biomedical and iii) special. WHO, on the other hand, suggests a more detailed HSW classification:

General medical/health care waste: paper, plastic, glasses and other non-infectious byproducts;
Infectious biomedical waste: blood, secretions, needles, syringes, vaccines and materials contaminated with infectious agents;
Chemical waste: disinfectants, formaldehyde, chemotherapy wastes, Mercury and other chemicals;
Radioactive waste: wastes generated during nuclear medicine, clinical testing labs, etc.;
Anatomical waste: corpses and human remains;
Miscellaneous: special waste due to its volume, shape, etc. should need special storage and treatment.

In Guyana, it was noted that the Georgetown National Public Hospital Corporation (GNPHC) has the most advanced HSW management system in the country. This health-care institution considers the following classification system for its hospital wastes:

- **Domestic waste**: Office waste, dry waste, etc.
- **Dietary**: Kitchen waste, food.
- **Infectious waste**: Soiled dressings, pampers.
- **Pathological and Special Wastes**: Mortuary, main operating theatre, laboratory waste. Sharps, syringes, X-ray films, etc.

At the GNPHC, each of these major HSW types tends to be managed separately, following a color-coding system based on the separation of HSW in colored plastic bags. In the other health facilities, HSW separation practices are limited.

Table 1: Color-coding of HSW in Georgetown National Public Hospital Corporation (GNPHC)

Type of waste	**Plastic Bag Colour**
Domestic	Black
Dietary	White / clear
Pathological and special	Red
Infectious	Yellow

The quantity of HSW generated in health facilities is proportional to the size of each of these. There are no field studies regarding the quantity and quality of HSW produced in Guyana. This is a major limitation that has to be solved while preparing specific HSW projects. It is estimated, however, that the GNPHC generates on average a total of 1,350 kg of HSW each day (Solid Waste Sectoral Analysis in Guyana, 2003). This hospital holds 601 beds, which means that waste generation is approximately 2.24 kg/bed/day, a figure that falls within the estimated range for developing countries (3 kg/bed/day). Considering the level of services provided in this hospital, it has the highest HSW generation rate per unit. This data was used to estimate Guyana's total HSW generation, implicitly introducing a margin of safety. Also, depending on the efficiency of HSW segregation, it can be said that 25% to 40% are hazardous or infectious waste. The estimated amount of HSW generated in health facilities of Region 1 to 10 is shown in the following table:

Table 2: Estimated amount of HSW by Regions in Guyana

Region	**Total number of hospital beds**	**Hazardous waste (kg/day) (25% - 40%)**		**General waste (kg/day) (75% - 60%)**		**Total waste (kg/day)**
		25%	**40%**	**75%**	**60%**	
1	85	47.6	76.2	142.8	114.2	190.4
2	107	59.9	95.9	179.8	179.8	239.7
3	183	102.5	163.9	307.4	307.4	409.9
4	**951**	**532.5**	**853.1**	**1,597.7**	**1,278.1**	**2,130.2**
5	37	20.7	33.2	62.2	49.7	82.9
6	554	310.2	496.4	930.7	744.5	1240.9
7	56	31.4	50.2	94.1	75.2	125.4
8	28	15.7	25.1	47.0	37.6	62.7
9	40	22.4	35.8	67.2	53.8	89.6
10	146	81.7	130.8	245.2	196.2	327.0
Total	**2,187**	**1,224.7**	**1,959.5**	3,674.0	2,939.2	**4,898.7**

Source: Authors' calculations based on Sectoral Analysis of Solid Waste in Guyana. MOH, PAHO, 2003.

In Guyana, the total hazardous HSW generation ranges from about 1,23 to 1.96 T/day. The maximum and minimum generation values vary according to the level of HSW segregation at source. According to this information, Region 4 and Region 6 are the biggest hospital waste generators, achieving together almost 70% of the total hospital solid waste in Guyana. In Region 4 is located GNPHC and in Region 6 is New Amsterdam Regional Hospital. No references of other relevant medical non solid waste generation was found during field visits.

Legal and Institutional Aspects

Institutional aspects

Responsibility for solid waste management in Guyana lies with several Government ministries. There are a number of institutions that have some functional responsibilities, but there is no a national body which has comprehensive responsibility for policy-making, directing, advising, controlling and monitoring the solid waste system.

The development of macro-strategies for national development is a responsibility of the Central Government. Although waste management was not specifically addressed, pollution prevention was highlighted, particularly stating that an Environmental Protection Commission will be established. This includes the Environmental Protection Agency and other agencies responsible for environmental protection.

The Environmental Protection Agency (EPA) was formed in 1996 under the Environment Protection Act (1996) and currently reports to the Office of the President.

It has the responsibility for:

- establishing regulatory frameworks and enforcement for the reduction of litter and the discharge of waste generation
- development of design criteria for the construction, operation, maintenance and monitoring of facilities for the control of pollution and the disposal of waste
- governing the location and classes of disposal sites
- governing and regulating the management of waste and prescribing standards for waste management systems.
- public awareness and education programs and the dissemination of information that can enhance effective waste management practices.
- permitting permission for landfill sites, incinerators etc.

The MOH provides some technical advice regarding waste management. This is done through the Environmental Health Units, which are each given responsibility for a number of public health districts. The environmental health officers are responsible for approving sanitary facilities (septic tanks and on-site disposal facilities). The MOH has a signed Memorandum of Understanding (M.O.U.) with the EPA to handle matters pertaining to environmental health.

The Police Force of Guyana can charge any person who commit a criminal offence. These offences include anything that constitutes a common nuisance, affects the health of the public and

littering/dumping. However these offences are not deemed high priority and as a result few charges are instituted.

The above mentioned institutions (EPA, the Guyana Police force), and others like the Public Health Officers, the city constabulary and the cleansing unit of the M&CC have within the scope of their powers, monitoring, collection and disposal of waste. However, lack of personnel and appropriate training have severely restricted their effectiveness. In this context, the MOH has direct responsibilities in HSW at least in those under their administration, which are the great majority.

Legal Aspects

The legal and regulatory framework regarding solid waste management in Guyana is governed by the Common law and several legislative instruments which operate at the national, municipal as well as regional level. Cohesion and integration among these instruments are almost non existent, which results in jurisdictional conflicts and difficulties concerning the scope of the duties and responsibilities created under the various instruments. In addition, many of the instruments are outdated, which raises the question of their relevance to the circumstances of today. There is little information on specific legislative instruments about health care waste. Most of these instruments are related to solid waste management in general.

The Sector Analysis of Solid Waste carried out by PAHO (October, 2003) emphasized the following legislative instruments related to solid waste management:

(a) **The Common Law**

Two areas are relevant to Solid Waste Management; these are found in the civil wrongs of nuisance and 'The Rule in Rylands v Fletcher (1868) LB 1 Ex 265; LR 3. H.L 330)'. Nuisance is also prosecutable as a criminal wrong. These civil wrongs can apply mainly with respect to the disposal of solid waste. A common law nuisance will arise when the disposal of solid waste causes an unlawful interference with a person's use or enjoyment of land, or some right over, or in connection with that land. Smells, smoke and other results of improper disposal may create causes of actions for the owners and occupiers of land close to disposal sites.

The Rule in 'Rylands v Fletcher', imposes strict liability for any damages caused, on any person who for his own purposes brings onto his land and collects and keeps there anything likely to do mischief if it escapes. He does so at his own peril, and is liable for all damage which results as a natural consequence of the escape. This rule covers both personal injury and injury to property, and has arisen regarding the improper storage, accumulation and disposal of noxious substances, highly flammable substances, oil, and rusty wire. The critical elements under this rule is that there must be an escape of the substance, and the accumulation must not be a natural use of the land.

Health Sector Specific Legislation

The legislative instruments highlighted in this section have a direct impact on, and relevance to the solid waste sector. These instruments provide the framework for the setting of policy, the establishments of the duties and responsibilities for the delivery of services within the sector, including administrative duties, contractual powers, health requirements and also sanctions for offences related to the sector. These instruments are a useful foundation but are in need of reform.

The Environmental Protection Act NO. 11 of 1996 - This Act seeks inter alia to establish a comprehensive framework, for environmental management, including solid waste management, at a national level. The framework includes setting of policy, the issuing of guidelines, establishment of standards, monitoring as well as enforcement.

The Public Health Ordinance Act Cap 145 Laws of British Guiana 1953 Edition - Passed in 1934 this Ordinance represents the oldest laws in Guyana regulating solid waste management. This Ordinance has provided a framework on which many of the municipal by-laws relating to solid waste were built and it was responsible for establishing the initial scope of duties and responsibilities regulating waste collection and disposal. It is still relevant and is used today to enforce several offences including littering.

The Municipal and District Councils Act CAP 28:01 (As Amended) - Together with the regulations and by-laws made there-under, this Act comprises the main body of written laws governing solid waste management within the Municipalities. Municipal cleanliness is governed by the City of Georgetown (Collection and Disposal) of Waste By-laws, a municipal by-law which has been in effect for more than twenty years.

Some instruments enacted under and through powers conferred by primary Acts that take the form of by-laws and regulations are listed below. In view of the lack of specific legal instruments, they are, somehow, related to health care waste management.

The City of Georgetown (Collection and Disposal) of Waste By-laws. Passed in 1981 these by-laws established a framework governing the collection and disposal of waste, providing for several definitions of waste including combustible waste, commercial waste and waste in general. It also established a framework that is intended to regulate offences relating to waste disposal, including dumping of waste. Provision is also made for the disposal of waste by incinerators, however few criteria are set for the operation of these incinerators, save that they should not be a nuisance.

The Offensive Matter Removal By-Laws - These by-laws were made under the Public Health Ordinance for the City of Georgetown and confirmed on the 16th August, 1904. Though Offensive matter is not defined, this By-law creates an offence of carrying 'offensive matter' within the limits of the city between the hours of 6.am and 6 p.m. It also imposes standards for the vessels used for the carrying of offensive matter. Further, it creates a duty to clean any spills which result from the carriage of offensive matter. In any reform of the technical legal standards of the sector, this by-laws must be considered.

The Scavenging and Cleansing of the City By-laws - Confirmed by Governor and Court of Policy of the 26th July, 1917. and also applicable to NDCs, this by-law is intended to regulate the disposal of certain types of refuse. It introduces a definition of refuse and provides for separate classifications.

Regulation No. 7 of 2000 The Environmental Protection (Hazardous Wastes Management) Regulations 2000 - These regulations provide a framework for the intended management of Hazardous Wastes. Its consequences for the definition, classification and categorization of waste within Guyana must be noted.

Inter-Sectoral Legislation

The Water and Sewerage Act (No.5 of 2002) CAP 30:01 - In addition to establishing the jurisdiction of several entities including the Guyana Water Incorporated, this Act creates an offence regarding the pollution of water ways with waste. This Act becomes relevant as three of the municipalities (Georgetown, Linden and Bartica) are serviced by waterways, the pollution of which will be outside the jurisdiction of the municipalities, primarily due to the provisions of this Act.

The Pesticides and Toxic Chemical Act (No. of 2002) (CAP 68:09). - The mechanism established under this Act have some relevance to the management of hazardous wastes. These include incorporation of the representatives of the Environmental Protection Agency (EPA) into the management structure suggested, together with requirements regarding handling, transportation and disposal of pesticides and toxic chemicals.

The Occupational Safety and Health Act CAP 99:10 - This Act introduced a duty on employers to conduct work in a manner which does not cause the discharge of any noxious, hazardous, or polluting matter into the air, water, or sod. This Act can serve as a tool to hold liable persons who may dump materials indiscriminately, as a product of the work process. The added duty imposed regarding information on the handling and disposal of hazardous chemicals should be noted. This Act is also relevant to the work of the employees of the private contractors responsible for the collection and disposal of waste

The East Demerara Water Conservancy Act CAP 55:03 - The Board established under this Act controls the surface water supplied to the Georgetown Municipality and many of the Coastal districts. This Act establishes as an offence which is monitored by the Board, for any person who throws any earth, dirt, stones, broken bottles, filth and any other substance likely to contaminate conservancy water or water in a reservoir.

The Criminal Law (Offences) Act CAP 8:01 - The main source of serious criminal offences in Guyana, this Act establishes as a criminal offence for everyone to commit any common nuisance which endangers the lives, safety, or health of the public, or which injures the person of any individual. The penalty for this offence is imprisonment for two years.

The Summary Jurisdiction (Offences) Act CAP 8:02 - Designed to cover less serious offences, provisions affecting solid waste can be found in Section 153(1) under the title Minor Offences, chiefly in 'Town'. The offences mainly surround acts of littering. The Offences find any person who commits any of the following acts if found guilty, liable in each case, to a fine of not less that seven thousand dollars. These acts include : (i) in any public way or public place, or in any public canal, throws or lays any coals, stones, slates, shells, lime, bricks, timber, iron, firewood, or other materials; (ii) throws or lays any dirt, litter, ashes, or night soil, or any carrion, fish, offal, rubbish, or other matter or thing, or commits any nuisance, on any public way or public place; (iii) or causes or permits any offensive matter to run from any slaughter-house, butcher's shop, stall, kitchen, or dunghill into any public way or public place; or (iv) in any town deposits in any place whatever any offensive matter or thing to the injury or annoyance of any inhabitant or passenger in the town. And (v) Throws, or being the owner or occupier of any house or other building in any town permits to be thrown, from any part of the house or other building any, slate, brick, rubbish, water, or other thing. These offences are liable to prosecution by the police.

Some standards regarding aspects of solid waste management have been set in various legislative instruments, but they need to be improved. For example, there are standards regarding waste receptacles, disposal machinery and equipment, as well as hours during which collections should

not be made, in several by-laws passed under the Municipal and District Councils Act CAP 28:01.

Wastes definitions, classification and categorizations were introduced by Regulation No. 7 of 2000 The Environmental Protection (Hazardous Wastes Management) Regulations 2000. This regulation specifically defined hazardous waste and provided classifications based on chemical and reactive characteristics, and introduced a categorization based inter alia on 'hazardous industrial waste', hazardous chemical waste, flammable waste, clinical waste, and severely toxic waste. These regulations also introduced into the legal framework definitions of medical waste as well as incinerator waste, which appear to be excluded from the definition of hazardous wastes. No standard procedures to measure and asses hazardous and medical waste were found.

Enforcement can be described as weak, due to several factors including personnel, resources and adjudicative attitudes. Provisions exist under several laws prohibiting certain activities. This provides a basis for enforcement, but its importance is diminished by potential conflicts in enforcement powers, a lack of knowledge and inadequate fines.

Biomedical Waste Management Practices

The vast majority of health establishments in Guyana are public are under the MOH. Depending on their size, they are classified as health post, health center, district hospital, regional hospital and national hospital. There is a relatively small number of private clinics in Georgetown.

In order to better understand the organizational and technical aspects of HSW management in Guyana, it is necessary to know the general context of the solid waste management system. In Guyana, there are no fully developed sanitary landfills. The Mandela sanitary landfill in Georgetown is actually an open-air dumping site. This is why the Mayor and City Council of Georgetown have planned to build a sanitary landfill in the Eccles area with IDB's support. Moreover, there are no incinerators or treatment plants properly equipped for special, industrial or hazardous waste. The city of Georgetown's incinerator is nearly 50 years old and is a waste burner without any environmental control device. The environmental legal and institutional framework for HSW is still in the process of consolidation.

The capacity for enforcement and environmental social awareness is still limited. Within this context, cities dispose of waste in open-air dumping sites, which poses severe risks for the population's health and the environment. During field visits, it was noted that the MOH supervisors or environmental health officers do not customarily provide specific guidelines for proper HSW management, that the medical and paramedic staff in general have not received training in HSW management and that there are no protocols or written guides on this topic.

The GNPHC is the only national hospital and it is the most important one in the country. About two years ago, a color-coding system for HSW management was been implemented. It is based on a 4-color system. Pathological and special waste (red bags) and infectious waste (yellow bags) are taken to the Georgetown incinerator, while domestic and dietary waste are disposed of in the Mandela sanitary landfill. Both activities are carried out through contracts with private enterprises.

Except for the GNPHC, all health facilities, regardless of their size, face difficulties at different levels. Although the levels of waste segregation are practically nonexistent, sharps and needles are used in accordance with some minimum technical and sanitary criteria. The use of sharps and needles does indeed deserve special mention. These wastes are actually separated in special

plastic or cardboard containers, either red or yellow. And when these are not available, the nurses use their good judgment to build special containers for sharps and needles out of recycled cardboard boxes. The other HSW types are practically not properly separated at source and end up mixed with sharps and needles during the process of collection and storage inside the health establishment.

In general, health posts, health centers, district and regional hospitals burn and bury the waste and it is common practice for the Municipality or the local NDC to remove the ashes and other non-combustible waste, such as glass and metals, to dispose of them in the community open-air dumping sites.

The level of equipment for HSW burning varies according to the size of each health facility. In health posts and health centres, HSW is burned in small concrete boxes. In district and regional hospitals, one can find small furnaces equipped with a combustion chamber, an ash removal system and a chimney. In these hospitals, the local Municipality or local NDC also usually remove the ashes and non-combustible waste.

Table 3 shows the most common HSW disposal practices in Guyana:

Table 3 : HSW management and disposal practices in selected Guyana health establishments

Health Establishment	**Processing through on-site burning**			**On-site burial**	**Ash and non-combustible waste removal**	**Collection and disposal outside the hospital**
	Open-air	**Concrete container**	**Burner with chimney**			
Medical Center						
Lodge		*X*		*X*		
David Rose		*X*		*X*		
Agriculture						*X*
Campbellville		*X*			*X*	
Rosignol	*X*				*X*	
Ithaca	*X*			*X*		
District Hospital						
Charity	*X*			*X*		
Wismar			*X*		*X*	
F. Wellington			*X*		*X*	
Skeldon			*X*	*X*	*X*	
Regional Hospital						
Suddie	*X* [1]	*X* [1]				*X*
Mckenzie	*X*		*X*		*X*	
New Amsterdam	*X*		*X*		*X*	
West Demarara	*X*		*X*		*X*	
National Hospital						
GNPHC			*X* [1]			*X*
Private clinic						
St. Joseph's Mercy						*X*
Woodlands						*X*

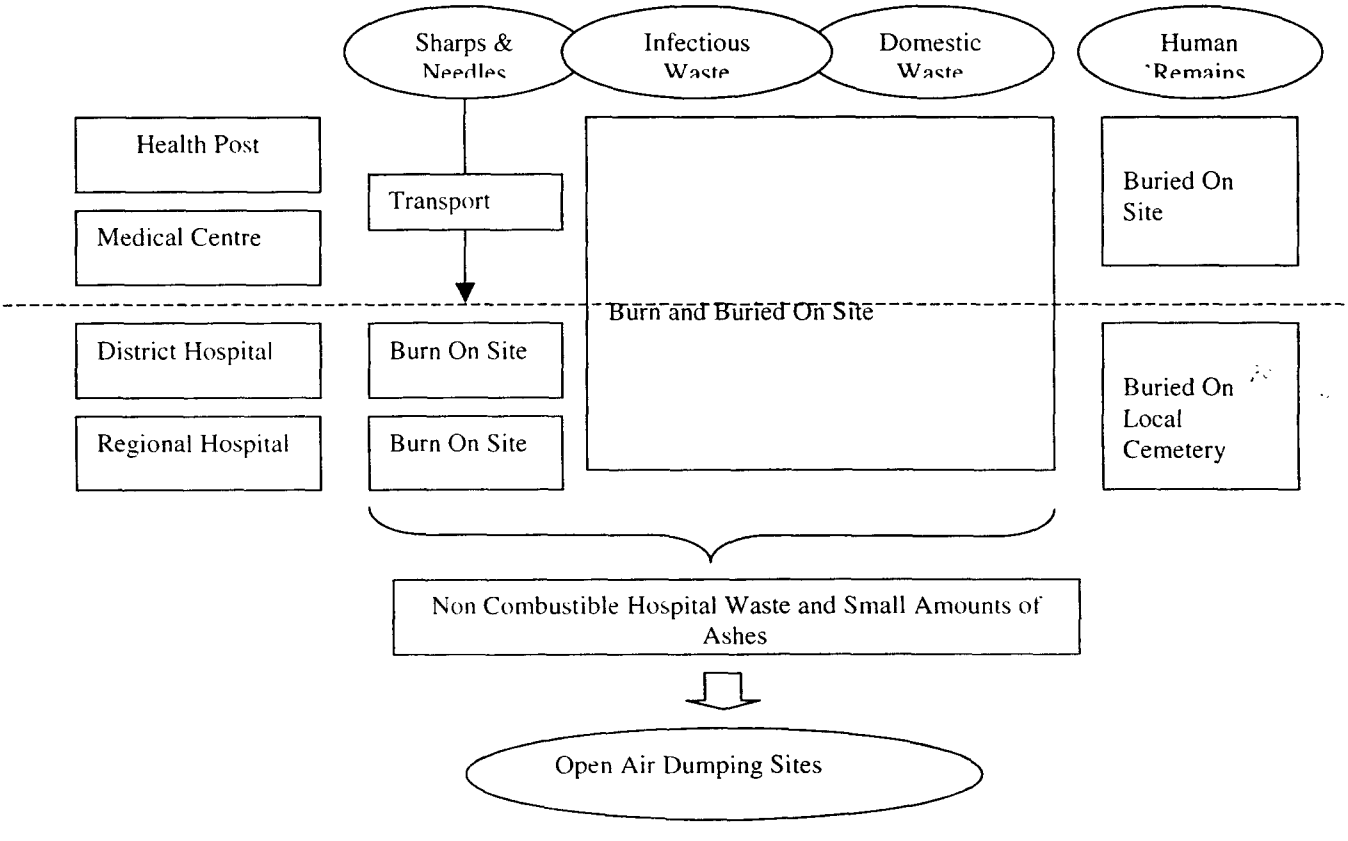
[1] The HSW burning site is located outside the hospital.

Table 3 shows that in nearly all health facilities, HSW is burned on site. Thirty percent (30%) of health establishments bury the HSW, while 76% contract a third party to remove the ashes, non-combustible waste and HSW in general. During the field visits, it was also noted that all health establishments have a particular streams for human waste management. The bodies are handed over to the families. And in regional and district hospitals, human remains are buried in local cemeteries, following agreements with local funeral homes. In health posts and health centers, human remains are buried on site and sharps and needles are, in many cases, handed over to the regional and district hospitals, where they are finally burned.

The level of HSW recycling is limited. It is done mainly in Georgetown, where recycled materials consist essentially of glass and plastic containers. In the areas outside Georgetown, HSW recycling is practically non-existent, as it is limited to the sporadic recycling of containers such as glass bottles.

Within this context, and as was mentioned before, all HSW (including sharps and needles) are mixed during the collection and internal storage process.

In the Georgetown, as noted, neither the GNPHC nor the private health facilities visited carry out on-site treatment. In all cases, the Mayor and City Council of Georgetown's private contractor takes the waste to the incinerator. This is done through a private agreement between the health establishment and the contractor. The following graph illustrates the biomedical waste management cycle:



In the private health establishments visited, it was noted that there is some level of HSW separation. In general, sharps and needles, as well as infectious and domestic waste, are separated, although no standard color-coding system is used. Except for the GNPHC, no written HSW management procedures have been found in any private hospital.

Knowledge, Practices and Behavior in the Health Facilities

Overall, staff are aware of the health risks associated with the handling of sharps and needles, and of HIV contagion in particular. Sharps and needles are thus placed in special containers, whether plastic or cardboard (see photos). Later, however, the problem remains since these materials are generally mixed up with all other HSW.

All nurses are instructed not to re-cap the needles. However, during the field visits, it was noted that needles are re-capped or not re-capped without distinction, according to the health staff members' personal practices. This indicates a weakness in the dissemination and application of the MOH general recommendation not to re-cap the needles due to the inherent health risks.

On the other hand, it has been found that the medical and paramedic staff at the Linden Complex Hospital (Mckenzie and Wismar) were the only ones who had received some training in HSW management. This was due to a one-time training initiative by PAHO, which developed a training module in these health facilities.

Apart from sharps and needles, HSW management practices are limited, whether because of a lack of equipment or of limited knowledge in the field. The EHOs sent to the regions by the MOH can do little to provide technical assistance and to raise awareness among the staff of health establishments, as they themselves have not received specific training in the field.

The medical and paramedic staff showed great interest in receiving continued training in HSW management and stated that it will be utterly important to have standard procedures and written protocols for HSW management.

Conclusions and Action Plan for Improving Biomedical Waste Management Practices

The assessment of the health facilities in Guyana shows that there is an adequate level of segregation, in-house handling, treatment and ultimate disposal of most biomedical wastes, although there are gaps in management, equipment, incineration and treatment that present risks to the integrity of the overall system. This results in part from the system being derived from the application of general infection control practices, and not seen as a specifically targeted or regulated area of attention.

Improving the situation, and mitigating the risks will be addressed through a set of system-wide interventions as follows:

(a) Improving the legal and regulatory framework: consultants will review the legal and regulatory framework that exists and propose improvements in definitions, management arrangements, scope of coverage of regulation to include the transportation of wastes and residues and site disposal.

(b) Codification of practices: in consultation with facility management and with the support of outside experts, practices and procedures will be codified, to ensure that all steps in the system were specifically covered, and that "international standards" were applied.
(c) Clarification of management responsibilities: from practice and regulations, facilities will reinforce and/or establish biomedical waste management responsibilities in clear personnel assignments.
(d) Staff training and development: the MOH should organize and conduct a program to train and familiarize employees in all of the 173 facilities with the new guidelines and protocols that have been developed. It will then continue to monitor the application of these under the authority of the revised regulatory framework.
(e) Upgrading facilities and equipment: the application of new practices will be supported with a complement of small equipment and specific site improvements and/or equipment repairs as necessary for their application (protective gear, trolleys, bins and containers, monitoring and recording equipment, fluid waste containers and piping, etc). In addition, consultants will review the system demands for inter-site transportation of wastes, incineration and disposal, leading to a recommendation for investments in new incineration and disposal technology. These investments will also be financed.

The MOH will manage the implementation of the above action plan to be supported under the project's Component III (a full description of the above action plan is in the project files).

Civil Works to be Financed Under Proposed Project

The objective of the interventions to improve the infrastructure as part of the proposed project will be to enhance the response capacity of health facilities to provide quality services and scale up the HIV/AIDS program. During project preparation, the project team conducted site visits and met with the directors and staff of health facilities, and with the Project Administrative Unit of the IDB (currently financing a Health Sector Reform Program through the MOH), in order to identify and confirm a list of sites requiring space conditioning and rehabilitation, as well as small works for the installation of the information system, with World Bank project financing.

As assessed during project preparation by the Project team, it is expected that the environmental and social impacts resulting from the execution of the above-mentioned civil works during the implementation of the project will be minimal, in view of the following considerations: the vast majority of the interventions are refurbishing works within the interior of the facilities, thus they will not affect the activities nor the traffic in the neighborhoods, and will take into the account the environmental guidelines listed below for civil works.

In addition, the programming of works for the new project will include the adoption of procedures currently followed under an IDB-financed project in the health sector for supervision of works, and in detail in the bidding and contracting documents for the protection of the environment and occupational safety.

Stakeholder Consultation

The preparation of the biomedical waste management audit involved ample consultation with authorities and staff of health facilities, including private sector providers. In addition, different sectoral stakeholders have provided feedback on project objectives, components, assessments (including technical, environmental, and economic and financial assessments), and implementation strategies. These groups also endorsed the proposed investments, including those contemplated for the strengthening of the biomedical waste management systems in the

participating health facilities. The Government of Guyana also approved the proposed investments under this project, including the investments needed for improving the biomedical waste management system in participating health facilities.

Management of Environmental Risks of Small Construction Works

The proposed HIV/AIDS Prevention and Control Project in Guyana, building upon the environmental norms and guidelines used during the implementation of the IDB-financed health project, envisages rehabilitating and/or conditioning available space of several health facilities. In the preparation of the request for proposals, the project's PCU, along with the agencies involved, will take into account the following guidelines that will be incorporated in the project's Operations Manual and Standard Bidding Documents for Civil Works. Particularly, appropriate specifications will be described in the bidding documents for civil works to mitigate environmental risks that may be identified.

Environmental Screening

The PCU will assess the potential environmental risks of the project's civil works investments which will depend on the type of construction, area available (congested vs. open area), the location (urban vs. rural) of the proposed construction and whether it is new work or space conditioning in existing facilities.
In addition, if required, prior to the undertaking of civil works, the identification of the following risks may take place:

(a) Interruption or limitation of accesses to dwellings or businesses either permanently or temporarily (during construction).
(b) Encroachment/reduction of green areas, parks, and other recreational areas.
(c) Demolition of buildings of high architectural or historical value.
(d) Deterioration of urban quality and property value in the immediate vicinity of the works or deterioration of unique architectural characteristics in the neighborhood.
(e) Increased accidents in areas with high density of schools, hospitals, and commercial use;
(f) Harming urban infrastructure (sidewalks, power and telephone lines, water and sewerage mains, etc.).
(g) Creating nuisances during construction (dust, wastes, and heavy construction traffic).
(h) Raising natural hazards (floods, soil instability); and
(ij) Protecting historically and culturally significant sites.

Bidding documents and contracts will specify terms and conditions governing the works activity to minimize and mitigate these risks as required.

Environmental Management Tools
Environmental considerations for the engineering design

The engineering design of civil works, if required, will take into consideration: (i) connections of the buildings to the potable water system and the capacity of the existing water distribution network or the need to establish a water supply system for the building (well, storage tank, pumping station, etc.); (ii) connection to the sewerage network and the need for capacity expansion for receiving collectors or the need for a wastewater treatment system for the building (septic tank, infiltration ditch); (iii) the treatment of wastewater before being discharged to the

sewerage networks or the wastewater treatment system; (iv) the management of runoff and the facilities for its recollection and evacuation, having in mind the existing downstream systems; (iv) the systems of recollection, storage and transportation of solid wastes generated in the building, incorporating the structures for separation and recycling; (v) appropriate access systems for pedestrians, municipal and inter-municipal buses, bicycles , children and handicapped people; (vii) the need to integrate building design with architectonic characteristics of the surrounding neighborhood; and (vii) avoiding the use of materials such as wood from tropical forests, lead-based paints, asbestos, for example.

Environmental Enhancement

The architectural designs could bring opportunities to incorporate and reinforce the criteria of environmentally friendly buildings. The feasibility of incorporating these aspects into the design will be analyzed during the conceptualization phase of the architectural designs and during the engineering designs. This analysis could include: (i) solar Commissions to satisfy totally or partially the electricity needs; (ii) rain water storage for the irrigation of gardens and green zones; (iii) maximizing natural light in order to minimize artificial light needs; (iv) planting of native species in gardens and green areas; (v) natural ventilation systems, minimizing the necessities of air conditioning; and (vi) the stabilization of slopes using vegetative measures.

Environmental Management of Construction Activities

Bidding documents will request contractors, as needed, to address the following issues when deemed significant by the PCU and participating line ministries: (i) pedestrian safety and traffic congestion during construction due to the increase of heavy traffic (of the construction itself and from traffic detours) in high traffic avenues and exit ramps; (ii) dust and particulate materials, causing nuisances to surrounding families and businesses, specially to vulnerable people (children, elders); (iii) undesirable noise levels due to the machinery and equipment specially in areas with hospitals, homes for the elderly, schools; (iv) degradation of lateral streets due to heavy equipment machinery and traffic detours; (v) the interruption of services (water, electricity, telephone, bus routes) during construction; (vi) the adequate disposal of garbage, metals, used oils, and excess material, generated during construction; (vii) the need of informing the population about construction and work schedules, interruption of services, traffic detour routes, provisional bus routes; and (viii) pedestrian security measures, specially for school children, during construction.

Bidding documents will also ask for the identification of suitable sites for waste disposal, the environmental management necessary (compacting, re-soiling and re-vegetation, drainage control), and the associated transportation costs should be included in project design and cost estimates.

Environmental Supervision during Construction

Supervision of construction will include the compliance with the environmental specifications of contracts.

Environmental Measures during the Operational Phase

During the operational phase of the civil works, if required, adequate provisions will guarantee: (i) the maintenance of the systems of collection and treatment of wastewater; (ii) the adequate collection and disposal of solid waste, incorporating recycling systems and the separation of materials; and (iii) the maintenance of complimentary systems (solar Commissions, etc.). The

engineering design should include the preparation of operations manuals and maintenance of all systems.

Public Consultation Prior to the Construction Phase

The PCU may identify the need for community consultation in the area of influence of the proposed civil works. To this end, a process will be undertaken with the assistance of recognized professionals for disseminating information and generating feedback from stakeholders who may be specifically targeted and the public at large. The consultation program may involve both formal and informal presentations and meetings with the target groups, and information dissemination campaigns.

Institutional Arrangements and Responsibilities for Implementation and Supervision of Mitigation Activities

The MOH through the PCU will be in charge of managing the implementation and supervision of the mitigation activities identified in this environmental assessment.