BELIZE NATIONAL MEDICAL WASTE MANAGEMENT
ASSESSMENT

1. ASSESSMENT

CLEOPATRA WHITE POLICLINIC II (CWP) AND
MATRON ROBERTS POLYCLINIC II (MRP)

CLEOPATRA WHITE POLICLINIC II (CWP)

CWP (see photographic attachment) is a sub district only consultation hospital. The estimated number of outpatients is 120/day. It undertakes only minor surgical activities like injections, dressings, and wound care. It produces general, pathological, infectious, sharps, and pharmaceutical wastes which are originated in the outpatient clinic. The sharps are disposed at source, using either clorox boxes (see photo 3, 4, 9) or internationally standardized cardboard boxes (photo 4). The pathological wastes are also disposed at source in red plastic bags whenever these are available. Both, sharps and pathological wastes are collected once a week by the maintenance department for incineration. The pharmaceutical wastes (see photo 17, 18) (expired drugs produced in small quantities) are sent to the centralized supply office. They are also finally disposed by incineration. The incineration takes place in the KHMH Hospital.

Color coding is used for marking segregated wastes (see photo 6, 7, 10, 13). Red color (whenever bags are available) is used for pathological and infectious wastes, and empty clorox bottles are used as rigid containers for sharps. The segregated wastes are handled by the domestic who removes them. The segregated wastes are taken outside the clinic while waiting for final disposal.

Main Conclusions and Recommendations:

1. The collection and internal transport of wastes is done by hand and no special vehicles are used.
2. The waste handler (domestic) uses only rubber gloves as protective clothing during removal.
3. Sometimes green bags are used to segregate pathological wastes and they are stored with red bags in the same storing place.
4. There is no person designated to respond for the organization and management of waste collection, handling, storage and disposal. The domestic and nurses involved have been trained only on the job.
5. The number of persons responsible for waste handling is four to five, and the designation is approximately 2 hours/week. There is no waste management staff and no job descriptions regarding waste handling.
6. No instructions are given to newly hire waste staff regarding wastes handling and management.

7. Based on the persons interviewed (photo 2), nobody is aware of any legislation application to hospital waste management. No document exists outlining the hospital waste management policy, and there are no manual documents on handling and management of hospital wastes.

8. The hospital doesn't have a waste management plan, and there is no waste management team. No clearly defined procedures for collection and handling of wastes, either. The waste management responsibilities do not exist in the job descriptions of hospital supervisory staff.

9. The pharmaceutical wastes finally disposed by incineration sometimes include (photo 16, 17) empty cardboard boxes and paper which should be segregated and finally disposed as general wastes.

10. General wastes are not always segregated but mixed with both pathological, infectious and pharmaceutical (photo 6, 7, 13, 15, 18, 19).

11. No names or lock are used to identify and close the storage room used outside the policlinic to store all types of hospital wastes while waiting for final disposal (photo 21, 22).

12. Clear definition regarding the color coding of hospital wastes is lacking. White, red, green and black bags are used to segregate the different categories of waste. However, a mix of pathological, infectious and general wastes is made sometimes in the containers used for segregation (See photos 6, 10, 13, 15, 19).

**MATRON ROBERTS POLYCLINIC II**

MRP (see photographic attachment) is also a sub district consultation hospital. The estimated number of outpatients is 70 patients/day. Similarly CWP, it produces general, pathological, infectious, sharps and pharmaceutical wastes which are originated in the outpatient clinic. The sharps are disposed at source using empty clorox boxes. Both, pathological and infectious wastes are disposed at source using black and green bags. Because of cost reasons, no red bags are used. The pharmaceutical wastes are sent to the centralized supply office for incineration which takes place in the KHMH Hospital.

Labeling (white tape with corresponding names) is used for marking the segregated wastes. The segregated wastes are handled both by the care-taker (sharps containers) and the domestic (bags), who removes them.

**Main Conclusions and Recommendations:**

1. The black, green red and white bags (see photos 6, 8, 10) used for segregating pathological and infectious wastes are not always labeled so these type of wastes can be mixed with general wastes.

2. The waste handlers (care-taker and domestic) use only rubber gloves as protective clothing during removal of wastes.
3. No special trolleys are used to remove the segregated wastes. The full containers are removed by hand and taken outside the clinic while waiting for final disposal (photo 9).

4. The hospital doesn't have a waste management plan, and there is no waste management team. No clearly defined procedures for collection and handling of wastes, either. The waste management responsibilities do not exist in the job descriptions of hospital supervisory staff.

5. Based on the persons interviewed (see photo 2), nobody is aware of any legislation application to hospital waste management. No document exists outlining the hospital waste management policy, and there is no guideline on handling and management of hospital wastes.

6. The number of persons responsible for waste handling is 17, who have been trained only on the job.

7. There is no person designated to respond for the organization and management of waste collection, handling, storage and disposal. The domestic and nurses involved have been trained only on the job.

8. Both sharps (see photo 5), pathological and infectious wastes, are collected once a week for incineration. The incineration takes place in the KHMH Hospital. The general wastes are taken by the municipality and finally disposed in the Belize sanitary landfill (see photo 11, 12), which is really operated as an open dump.

Main Conclusions and Recommendations

CWP AND MRP

1. It is recommended that clearer definitions of the categories of waste be adopted by the hospitals. The color coded and labeled container and storage system must be reinforced and strictly followed to facilitate the segregation of medical wastes.

2. Both, CWP and MRP should have and apply a minimal hospital waste management plan and guidelines for the handling, storage, and disposal of medical and related wastes. The use of the manual “Safe Management of wastes from Health Care Activities” WHO 1999 is recommended.

3. In both, CWP and MRP, the waste management coordinator should be appointed and further trained, and the training should be conducted using the “Training of Trainers” approach so that other people can also take advantage of this training. The training programs should be appropriate for the different skill levels of the personnel working at these health care facilities, including the medical staff, the nurses, the domestics, the caretakers, and the housekeeping personnel.

4. The personnel involved in handling must be taught the right procedures for lifting wastes bags and containers. Where necessary, the adequate protective and safety uniforms and equipment should be worn.
KARL HEUSNER MEMORIAL HOSPITAL (KMMH)

KMMH (see photographic attachment) is a regional and national reference hospital. It provides general and specialist services. It offers 120 beds per day. There is a general ward including pediatric, internal medicine, obstetrics and gynecology, surgical, neonatal intensive care and private intensive care. It also offers services in an accidental emergency unit.

KMMH has an official “Medical Waste Management Plan”. This official document defines the types of medical wastes in the hospital (red waste, green waste, sharps and hazardous waste/chemical related). It also establishes segregation of medical wastes, procedures for handling medical wastes, wastes containerization, storage of wastes, waste handling and transportation (collection of wastes, waste collection schedule and transportation of wastes), waste treatment, waste disposal, precautions for personnel handling wastes, personnel hygiene, cleaning of equipment and storage areas, and monitoring and reporting of wastes management practices (inspection, reporting, correctional actions and enforcement, training and sensitization and responsibilities).

According to the plan, the red waste include any waste that has come in contact with blood, body fluids or other infectious material; green waste includes regular garbage and other non-infectious solid wastes; sharps include needles, scalpels, blades. stylets, lancets and broken glass; and hazardous wastes include residual liquid wastes, low-level radioactive wastes and expired drugs. Regarding segregation, the plan establishes that this is to done at the source or point of generation. General wastes should be placed in containers labeled non-infectious wastes and lined with green plastic bags. Infectious should be placed in containers labeled “Bio Hazard” and lined with red plastic bags. Pathologic should be placed in containers lined with yellow plastic bags. Sharps should be placed in a leak and puncture proof container and hazardous placed in clearly labeled leak proof containers.

The plan also establishes procedures for handling medical wastes by medical and nursing personnel. They include the provision of a tray or trolley to remove waste from treatment after completion of procedures; the preparation of this trolley with a receptacle to receive waste generated and a separate container for sharps. It also establishes that waste should be removed from the treatment area and placed in the appropriate container located in the dirty utility room immediately after the procedure is completed. In the same way, sets up detail waste containerization guidelines.

The plan document also includes storage of waste guidelines. According to them, storage for long periods is restricted to designated areas, such as dirty utility rooms, waste pick up points and cold storage. There are seven pick up points in the hospital clearly labeled with the bio-hazards symbols. Waste should be stored in labeled containers. Liquid wastes should not be stored but disposed of after treating with sodium hypochlorite solution. For waste handling and transportation, the document establishes that all wastes should be collected and removed from an area immediately before cleaning begins, on a daily basis within the patient areas, offices, rest rooms, and dining areas by housekeeping.
staff. Waste transportation inside and outside the hospital should be done according the
designated route and containers used should at all times be covered.

Regarding waste treatment, the document establishes that all red wastes and sharps
including red bags used and the sharps containers will be treated by incineration. This
process should be done at 1,800 ° F. The ash should be bagged, secured and transported to
the regular garbage dump site. Green waste should be collected by Belize Waste Control
and disposed at the Municipal Dump Site. The document guideline also includes
precautions for personnel handling wastes and standard personnel protective equipment
which includes: protective overalls, heavy duty gloves, masks, rubber boots, and face
shields. It also includes instructions for the cleaning of equipment and storage areas and
guidelines for monitoring and reporting of waste management practices, correctional
actions and reinforcement, training and sensitization (periodic workshops, orientation for
new staff, and information materials). In the same way, responsibilities are also included
for the Chief Executive Officer, the Directors, the Quality Assurance Coordinator, the
Hospital Infection Control Committee, the Assistant Quality Assurance Coordinator, the
Infection Control Nurse, the Housekeeping Officer, the Domestic Auxiliaries, the Unit
Manager and Section Heads, the Maintenance Supervisor, and the Porters. The plan finally
includes medical waste management inspection forms.

According to the visit, the type of solid waste produced include general waste
(medical, surgical, emergency, outpatient clinic, support services, pharmacies, central
sterile supply, kitchen, engineering, administration and public areas), pathological wastes
(operating theater) and autopsy room, chemical wastes (laboratories and pharmacy),
infectious wastes (medical surgical, operating theater, recovery intensive care, isolation
ward, oncology unit, outpatient clinic, autopsy room, laboratories, blood bank, central
sterile supply and engineering), sharps (medical, surgical, operating theater, recovery
intensive care, isolation ward, oncology unit, outpatient clinic, autopsy room, laboratories,
blood bank, pharmacy, central sterile supply and engineering), pharmaceutical wastes
(pharmacy) and pressurized containers (medical, surgical, operating theater, emergency,
outpatient clinic, support services, pharmacy and public areas).

The application of the plan mentioned above was observed during the visit, and is
illustrated in the following picture composition:

Photo 1 (Entrance to the hospital), photos 2, 3 (initial meeting with staff in charge of waste
management), photos 4, 5 (cleaning trolley transporting non-infectious wastes), photo 6
.medical ward), photo 7 (poster promoting the use of adequate personal protective
equipment), photo 8, 9 (containers and bags for hazardous and non-infectious wastes),
photo 10 (segregated bio-hazardous wastes), photo 11 (medication unit), photo 12
(segregation of non-infectious waste in the medical doctor and nurse station), photo 13, 14
(infectious waste posters in the waste collection point), photo 15 (surgical ward), photo 16
(lab entrance), photo 17, 18, 19, 20 (bio-hazardous segregation in the lab), photo 21
(segregation of sharps and bio-hazardous wastes in the lab), photo 22 (cytology unit), photo
23 (trimming unit), photo 24 (black bag used for segregating general wastes), photo 25
(priority specimens in the lab), photo 26 (labeled bin and red bag for bio-hazardous wastes),
photo 27 (morgue), photo 28 (storage room for red wastes/notice the room is completely
full), photo 29 (trolleys for red waste transportation), photo 30 (incinerator first chamber/notice presence of unburned plastic material), photos 31, 32, 33 (incineration location floor/notice presence of sharps and pathological unburned wastes ), photo 34 (accumulated red and green bags/the incinerator was not operating), photo 35 (old incinerator spare parts) and photo 36 (accumulated black and green bags/the incinerator was not operating).
Sharps are segregated at source. Plastic bottles and cardboard boxes are used as rigid containers. Used needles are not being re-encapsulated because of accidents in the past. The full rigid containers are handled by the domestics and removed to a storage place before final disposal. Pathological, infectious and chemical wastes are monthly incinerated. The pressurized containers are classified as general wastes and they are finally disposed by Belize Waste Control and taken to the city dump. The gas containers are given back to the supplier.

Main Conclusions and Recommendations:

1. The hospital has an incinerator furnished by Shenandoah Manufacturing Co.,(USA). It has a primary and secondary chambers (pre and after burner). The incinerator was not operating and bad smells were present in the location of the final storage room caused by high accumulation of wastes. Information was given establishing that during the burning process, black smoke emissions are present indicating poor operating and combustion procedures. Moreover, unburned plastic material was found in the first chamber of the incinerator. This situation has produced complaints from the school located nearby. There was no actual data available regarding air emission quality. The smoke stack of the incinerator is too low compared to international standards.

2. Poor housekeeping and handling of wastes was found in the incineration place (see photos 30, 31, 32, 33) where spilled sharps, pathological and infectious wastes caused high sanitary risk for handlers and other employees. This situation should be solved.

3. The incinerator ashes are taken to the Belize City landfill. This landfill operates as an open dump, it is poorly managed, most of the wastes are uncovered and hospital wastes such as syringes, needles, etc. are exposed on the surface, offering a serious risk for workers.

4. The incinerator is operated and maintained by hospital personnel who have not received proper training. Incinerator operators should be further trained and the training should be conducted in “training of trainers” approach so that other people can also take advantage of this training.

5. The operation of the incinerator requires special consideration regarding the final disposal of wastes taken for incineration. The accumulation of these types of waste (pathological, infectious, etc) in the final storage room is a very serious sanitary hazard for all the personnel working in the hospital and the general public.

6. The operation of the incinerator requires also special consideration regarding air pollution problems caused by the poor combustion procedures and the low stack. An
appropriate training of the incinerator operators is recommended, since those installations represent a high capital investment and could be very costly to be operated and maintained if they are not properly managed.

**BELIZE MEDICAL ASSOCIATES (BMA)**
**UNIVERSAL HEALTH SERVICES HOSPITAL (UHSH)**

**BMA**

BMA (see photographic attachment) is also a private specialist hospital. The number of bed is 19/day, inpatients 12/day and outpatients 60/day, including a general ward (emergency, observation, maternity and intensive care unit).

It produces general, pathological, chemical, infectious, sharps and pharmaceutical wastes from the following sources: patient services (medical, surgical, operating theater), intensive care (isolation ward, emergency, and outpatient clinic), laboratories (biochemistry, microbiology, and hematology), pharmacy, laundry, kitchen, engineering, administration, public areas, and long term health care.

Waste segregation, collection, storage and handling in the BMA hospital is undertaken in a similar way as UHSH. However, the designated person responsible for organization and management is the maintenance employee. He has been trained only on the job and has not received any theoretical training. Nine employees are involved in the collection, handling and storage, using 12 hours/day for the whole group. Their experience and training is only practical. The waste management staff doesn’t have job descriptions detailing their tasks. Instructions are given to the newly hired waste management staff regarding waste handling. The interviewed person is not aware of any legislation application to hospital waste management. There is a short document outlining the hospital waste management policy and guideline on management. However, there is no waste management plan. The hospital does have a waste management team, and there are some clearly defined procedures. There is no waste management responsibilities included in the job description of supervisory staff or in the descriptions of the staff involved.

The photographic composition illustrates waste handling and management as follows: Photo 1 (Hospital entrance), photo 2 (initial meeting), photo 3, 5 (lining of general wastes), photo 4 (lining and container for red wastes), photo 6 (poster instructions for waste segregation), photo 7 (vehicle for transporting wastes), photo 8 (general waste bin), photo 9 (final storage room container green wastes), photo 10 (final storage room container for red wastes), photo 11 (final storage room outside the hospital), photo 12 (sharps container), photos 13, 14, 15 (red waste lining and container), photo 16 (box for segregating expired drugs).
UHSH

UHSH (see photographic attachment) is a private specialist health institution. The number of beds is 20/day, number of inpatients 5-16/day, and number of outpatients 75-100. It has a general ward and intensive care unit.

UHSH has a waste management plan. According to this document, and the information provided during this visit, the types of medical wastes produced are classified as follows: Red waste (waste that has come in contact with blood, body fluids or other infectious material), green waste (regular garbage and non-infectious solid wastes), sharps (needles, scalpels, blades, stylets, lancets and broken glass), and chemical or hazardous wastes (expired drugs, residual liquid wastes and low-level radioactive wastes). Different sources include: patient services (medical, surgical, operating theater), intensive care (isolation ward, emergency, and outpatient clinic), laboratories (bio-chemistry, micro biology, and hematology), pharmacy, laundry, kitchen, engineering, administration, public areas, and long-term health care. Segregation of medical wastes is done at source. General wastes are placed in a container with green labels and green plastic lining. Infectious are placed in containers with bio-hazard label and red plastic lining. Pathological are placed in containers with yellow plastic lining. Sharps are placed in leak and puncture proof containers, and hazardous are placed in label leak proof containers.

Color coded containerization is used. Red waste are lined with red bags and containerized in labeled (bio-hazard bins). Green wastes are lined with green bags containerized in labeled (non-infectious) containers. For sharps, plastic rigid containers are used which are sealed prior to disposal. Pathological wastes are placed in opaque plastic bags which are also sealed prior to removal. In fact, red, green, black and white bags are used for lining. Clorox bottles and cardboard boxes are used as rigid containers.

Regarding handling and transportation, the wastes are collected and removed before cleaning begins by the housekeeping staff (domestic). The bags are daily tied and taken to the pickup point. The waste handlers use gloves and uniform for the handling and transportation. Masks are only used when handling wastes produced from the care of isolated patients. The housekeeping vehicle is used for collection. There are two designated pick up points through out the hospital labeled with the bio-hazard symbol. The segregated wastes are stored at the back of the hospital while awaiting its removal. Transportation of the wastes from the hospital site to the disposal area is done by Belize Waste Control. Red waste and sharps are treated by incineration, and green wastes are disposed at the dump site of the city.

The designated person responsible for the waste management is the nurse director who has received training on the subject through lectures, workshops, and informal training. There are 8 persons involved in the collection, handling and storage of hospital wastes, who work two hours/day/person, and who have been trained on the subject. Part of the management staff has job descriptions detailing waste tasks. Newly hired waste management staff receives waste handling training. The interviewed nurse director is not aware of any legislation application to hospital waste management. She is aware of the document outlining the hospital waste management policy. There is a guideline document
for management of hospital wastes, and also a waste management plan. The hospital has a waste management team and defined procedures for collection and handling. There is no waste management responsibilities included in the job descriptions of hospital supervisory staff. However, the job description of personnel below the nurse director does include these responsibilities.

The practical application of the above-mentioned plan is illustrated in the photographic composition as follows: Photo 1 (initial meeting), photo 2 (housekeeping vehicle used for internal transportation of wastes/notice the green and red lining), photo 3 (green and red lining), photo 4 (sharp rigid container), photo 5 (poster instructions for classifying wastes), photo 6 (red waste bin and lining), photo 7 (expired drugs), photo 8 (red waste bin and lining in patient’s room), photo 9 (containers for storage of both, green and red wastes outside the hospital/notice bad housekeeping), photo 10 (container for green wastes/notice bad housekeeping and handling of wastes), photo 11 (locked container for red wastes/notice bad housekeeping and handling of wastes), and photo 12 (spillage of all kind of wastes in the final storage place/notice spilled pathological, infectious and general wastes).

**Conclusions:**

**BMA**

1. The BMA Hospital does not have a minimal hospital waste management plan. The persons involved in the handling of wastes do not use adequate protective equipment.
2. The waste management and handling personnel have not been adequately trained apart from training on the job. The final storage room has not adequate signs and labeling and its operation conditions should be improved.

**UHSH**

1. Although some Belize national regulations do not allow the discharge of certain pollutant liquid wastes in the sewerage system and water bodies, the expired drugs wastes from this hospital are diluted and finally disposed in the sink.
2. A final storage and pick up room does not exist outside the hospital. As already illustrated in the photo composition, the containers used by Belize Waste Control for picking up, are placed in an open area outside the hospital. The housekeeping and final handling of wastes in this area is very poor. All kind of pathological, infectious and general wastes are spilled in this location producing high sanitary and infection risk for employees and the general public. This sanitary problem is affecting a restaurant located nearby (less than 100 meters).
Recommendations:

BMA

1. BMA should have and apply a minimal hospital waste management plan and guidelines for the handling, storage, and disposal of medical and related wastes. The use of the manual “Safe Management of wastes from Health Care Activities” WHO 1999 is recommended.

2. The personnel involved in handling must be taught the right procedures for lifting wastes bags and containers. Where necessary, the adequate protective and safety uniforms and equipment should be worn.

3. In BMA, a waste management coordinator should be appointed and further trained, and the training should be conducted using the “Training of Trainers” approach so that other people can also take advantage of this training. The training programs should be appropriate for the different skill levels of the personnel working at this health care facility, including the medical staff, nurses, domestics, and the housekeeping personnel.

4. Adequate signals and labeling to identify the final storage room location and the storing of health care wastes in this place should be implemented. Moreover, the following recommendations should be also implemented: The storage area should have impermeable, hard standing floor with good drainage. It should be easy to clean and disinfect. There should be water supply for cleaning purposes. There should be good lighting. A supply of cleaning equipment, protective clothing and waste bags or containers should be located close to the storage area.

UHSH

1. A final storage location for the health care wastes should be designated outside the establishment. The waste, in bags or containers should be stored in a separate area or room of a size appropriate to the final containers size, the quantities of wastes produced, and the frequency of collection.

2. The final storage area should have an impermeable, hard standing floor with good drainage. It should be easy to clean and disinfect. It should afford easy access for the handling of wastes. Both, the final containers and the area should be locked to prevent access by unauthorized persons. It should have easy access for waste collection vehicles, protection from the sun, and it should be inaccessible for animals, insects and birds. There should be good lighting and at least passive ventilation. The area should not be located in the proximity of restaurants or fresh food stores. A supply of clean equipment, protective clothing and waste bags or containers should be located conveniently close to the area.
3. Adequate handling of wastes and housekeeping practices must be implemented in the final storage area. The area now used must be relocated and another one should be selected far enough from restaurants and housing areas.

**NORTHERN REGIONAL HOSPITAL (NRH)**

NRH (see photographic attachment) is both regional and specialist hospital. Specialist services include: surgery, gynecology, obstetrics, internal medicine, pediatrics and orthopedics. It has 60 beds/day; 32 inpatients/day and 100 outpatients/day. It includes a general ward (male, female and pediatric), surgical ward (male, female and pediatric), maternity and nursery.

NRH produces general, pathological, radioactive, chemical, infectious, sharps, pharmaceutical and pressurized container wastes. Sources include: patient services (medical, surgical and operating theater), emergency, outpatient clinic, autopsy room, radiology, laboratories, blood bank, pharmacy, central sterile supply, laundry, kitchen, engineering, administration and public areas.

The institution categorizes the wastes as red (any waste that has come in contact with blood, body fluids or other infectious material) green (regular garbage and other non-infectious), yellow (chemical hazardous wastes, usually generated in the lab, pharmacy and x-ray department) and sharps (needles, scalpels, blades, styles, lancets and broken glass).

The segregation is done at the source. Non infectious wastes are placed in label containers (non-infectious wastes) and lined with green plastic bags. Infectious wastes are placed in containers labeled bio-hazard and lined with red plastic bags. Pathological wastes are placed in containers lined with yellow plastic bags, and sharps are placed in rigid containers.

**Conclusions:**

The attached photographic composition illustrates waste handling and management in NRH as follows: Photo 1 (Hospital entrance), Photo 2 (Initial meeting), Photo 3 (Pharmacy), Photo 4, 5, 14 (Can labeling), Photo 6 (Laboratory entrance), Photo 7 (Rigid container for sharps), Photo 8 (Instructions for sharps segregation), Photo 9, 14, 23, 24 (Lining and can for waste segregation), Photo 10, 11, 12 (Blood samples and used plastic bag containers), Photo 13 (Segregated and lined pathological and infectious waste), Photo 15 (Radiology entrance), Photo 16, 18 (Cans and lining for waste), Photo 17, 22 (Instructions for waste segregation), Photo 19 (Sink discharge piping), Photo 20, 21 (Emergency entrance), Photo 25, 26 (Final waste storage room), Photo 27, 28 (Incinerator combustion chamber), Photo 29 (Incinerator fuel gas tank), Photo 30 (Incinerator overview), Photo 31 (Waste transportation vehicles).

1. The document containing the medical waste management plan is considered to be adequate and comprehensive but its present application is limited. (Photo 1, 2, 3).
2. The color code segregation of wastes is not working. Black and green color bags are used for segregating pathological and infectious wastes. Red bags are not used. According to the information provide during the visit, this is due to supply difficulties in the local market. (Photo 9, 13, 16, 18, 23).
3. The institution has no estimated quantities of the different types of solid wastes produced or the total volume.
4. Although there are some general Belize liquid discharge regulations for sewerage systems, the waste chemical reagents are dumped in the sink. (Photo 19).
5. Adequate labeling is used only in the cans used for collection but not in the full lining bags used for segregation at source. (Photo 4, 5, 7, 14, 24, 31).
6. No adequate signals and labeling are used in the intermediate and final storage places. (Photo 25, 27, 28).
7. No adequate personal protective equipment is used by the persons involved in the handling the different types of wastes.
8. The waste team has not received adequate training in health care waste handling and management.
9. The total volume of wastes being treated in the incinerator includes a mixture of general, pathological, infectious and other wastes. So the incineration process is overloaded. (Photo 27, 28).
10. The incinerator operators have not had any training at all. They do not have a copy of the manufacture operation manual.
11. The operation of the incinerator requires also special consideration regarding air pollution problems caused by the poor combustion procedures and the low stack. An appropriate training of the incinerator operators is recommended, since those installations represent a high capital investment and could be very costly to be operated and maintained if they are not properly managed. (Photo 29, 30, 31).
12. According to the information received during the visit, the cost of gas fuel for the incinerator is very high because of the overloading during its operation.

Main Recommendations:

1. The strict and full application of the NRH Medical Waste Management Plan must be reinforced.
2. The incinerator is operated and maintained by personnel who have not received proper training. Incinerator operators should be further trained and the training should be conducted in the training of trainers approach so that other people can also take advantage of the training.
3. The waste handlers should be provided with adequate personal protective equipment and clothing for the removal of wastes.
COROZAL COMMUNITY HOSPITAL
(CCH)

CCH (see photographic attachment) is a district hospital. It offers 27 total beds per day, including 8 in patients and 150 out patients per day. It includes a male ward, female, maternity, accidents and emergencies, pediatric and isolation ward.

CCH has an official “medical waste management plan”. It classifies the hospital waste as general (non-infectious), infectious pathological, hazardous and sharps. The wastes are categorized as red, green and sharps. Red waste includes any infectious material or other waste which has come in contact with blood or body fluids. Green waste includes regular garbage and other non-infectious solid waste (household waste, food waste, plastics, tin glass containers, grass and foliage, construction waste, cardboard boxes, old equipment, old x-rays films, residual liquid waste, expired drugs and low level radio active waste. Sharps include needles, syringes, blades, broken glass and plastics, styletes and lancets.

According to the plan, the segregation of medical waste is to be done at the source. Non-infectious are to be segregated in containers labeled “non-infectious waste” and lined with red plastic box. Pathological wastes are to be placed in containers lined with yellow plastic box. Sharps are to be placed in a leak and puncture proof containers. Hazardous wastes are to be placed in clearly labeled leak proof containers.

Collection of wastes should be done before cleaning begins, waste generated in the dietary area are to be transported directly to the dump on a daily basis. Morgue’s waste should be transported in double red bags. Old waste must be collected on each shift and daily. Transportation should be done following the designated route. Regarding waste treatment, all red waste and sharps, including red bags used to contained waste and sharps containers should be treated by incineration. The supposed working temperature of the incinerator is 1800° F. Green waste do not require any treatment before disposal. The incinerator ash should be bagged and sent to the dump. Green waste should be collected by the municipal services.

All waste should be properly contained to prevent leakage of infectious materials as solids, liquids or aerosols. The storage of waste should be done only in containers labeled non-infectious or biohazard and in a cold storage unit. Personal protective equipment (overalls, gloves, boots and masks) should be used.

Main Conclusions and Recommendations:

The attached photographic composition illustrates waste handling and management in CCH as follows: Photo 1 (Hospital entrance), Photo 2 (Lists of different wards), Photo 3 (Male medical ward), Photo 4, 22, 25 (Waste container and lining), Photo 5 (Segregation of pathological and infectious in green lining), Photo 6 (Nurse Station entrance), Photo 7 (Female surgical ward), Photo 8 (Maternity ward), Photo 9, 10 (Waste container and yellow
lining for pathological and infectious), Photo 11, 30 (Containers for sharps), Photo 12 (Maternity ward equipment), Photo 13 (Container and lining for waste), Photo 14 (Morgue and incinerator overview), Photo 15 (Morgue entrance), Photo 16 (Morgue corps table), Photo 17 (Incinerator combustion chamber ash), Photo 18, 20 (Bad housekeeping in the incinerator area/notice sharps dumped on the floor), Photo 19 (Incinerator fuel gas tank/notice poor maintenance), Photo 21 (Container and lining for expired drugs), Photo 23 (Attendants handling waste/notice no use of protective equipment), Photo 24 (Containers for sharps), Photo 26, 27 (Black lining and container for pathological and infectious waste/notice black bag out of the container without any labeling to identify waste), Photo 28 (Incinerator combustion chamber/notice incineration of all types of waste and overloading on the incinerator), Photo 29 (Poor housekeeping in the incinerator area), Photo 31 (Incinerator operation instructions), Photo 32, 33 (Incinerator combustion chamber/notice unincinerated material).

1. The color code segregation of waste is not working. Although red bags do exist in stock, they are not used. Green and yellow bags are being used for lining pathological and infectious waste (see photo 4, 5, 22, 25).

2. Non consistent training is given to the staff involved in waste handling and management, and the waste handling and management staff does not have job descriptions detailing their tasks (see photo 23).

3. No adequate and consistent labeling is used to identify the containers and lining used for segregation and storage of the different types of waste (see photo 4, 5, 22, 25, 26, 27).

4. No adequate signals and labels are used in the intermediate and final storage places like in the morgue (see photo 14, 15, 16).

5. Red waste are being mixed with general common waste for final disposal through incineration, so the incinerator is overloaded and the combustion process does not work properly and the adequate working temperature is not reached (see photo 28, 32, 33).

6. Although CCH has a medical waste management plan, it is not being applied adequately and in practice simple control measures like the color coding and labeling are not working.

7. As already mentioned, the incinerator is not working properly. Unburned glass bottles could be observed during the visit in the combustion chamber. The incinerator is operated and maintained by hospital personnel who have not received proper training (see photo 17, 32, 33).

8. Bags containing both pathological and infectious waste are left and stored in non adequate storage places in the hospital without any labeling or identification (see photo 26, 27).
WESTERN REGIONAL HOSPITAL (WRH)

WRH (see photographic attachment) is both a regional and specialist hospital. Specialist services include gynecology, pediatric, general surgery, orthopedics, internal medicine, and oncology. It has 50 beds per day; 111 out-patients per day. The different wards include: accident and emergency; psychiatric; general ward (male and female medical, male and female surgical, critical care and isolation ward); maternity ward (female ward medical, female surgical and pediatric.

WHR produces general pathological, radioactive, chemical, infectious, sharps, and pharmaceutical and pressurized containers waste. Sources include patient services medical, surgical, operating theater, recovery/ intensive care, isolation ward, dialysis service, oncology service, emergency, out-patient clinic, autopsy room, radiology, laboratories, biochemistry, hematology, blood bank, pharmacy, central sterile supply, laundry, kitchen, engineering, administration, public areas, maternal and child health, dental health, environmental health/vector control.

Regarding waste segregation, collection, storing and handling, the sharps are segregated in rigid containers and taken to the morgue. The pathological wastes are also taken to the morgue which is the final storage room. The infectious wastes are segregated in red bags whenever those are available; they are finally disposed in a general waste container before incineration. The radioactive waste from radiology and the chemical waste are in some way diluted and finally disposed in the sink. “Big amounts of expired drugs are generated from donations together with the ones generated from the pharmacy. The pharmaceutical waste coming from sources different from the pharmacy is mixed with the general waste. The expired drugs from the pharmacy are finally disposed through incineration. The pressurized containers are also mixed with the general waste.

Generally the segregation takes place at source. Clorox bottles and cardboard boxes are used as rigid containers for sharps. Red bags are used whenever available and after they are full are taken to the morgue. Whenever possible white tape is used for labeling. The segregated waste is handled by the attendant and the domestic. The waste handlers use only gloves as protective clothing. Trolleys are used for internal transportation of waste. The only intermediate storage room used for segregated pathological and sharps waste is the morgue. In terms of final disposal of segregated waste, sharps, pathological and some infectious waste are incinerated; most infectious are mixed with general waste which are finally disposed together with the general waste in the municipal dump.

Regarding personnel involved in management of hospital waste, there is no a designated person responsible for management and handling, and the person involved has not received adequate training on hospital waste management. The persons involved in collection, handling and storage include seven attendants, eight domestics, three public health inspectors and one incinerator operator with a designated three hours per day journey. All this staff has been trained on the job. Some waste management staff have job
descriptions detailing their tasks but no training is giving to newly hired waste management personnel.

The hospital’s official interview is not aware of any legislation application to hospital waste management or document outlining the hospital waste management policy. There is no manual document or management of waste in the hospital and no waste management plan or waste management team in the hospital and clearly defined procedures. The waste management responsibilities are not included in the job descriptions or hospital supervisory staff.

**Main Conclusions and Recommendations:**

The attached photographic composition illustrates waste handling and management in WRH as follows: Photo 1 (Hospital entrance), Photo 2 (Initial meeting), Photo 3 (Container and lining for pathological and infectious waste/notice the use of black lining), Photo 4 (Instructions for infectious segregation), Photo 5, 8 (Pathological and infectious segregated waste/notice black lining), Photo 6 (Containers for sharps), Photo 7, 11 (Container and lining for waste/notice lack of labeling), Photo 9 (Emergency entrance), Photo 10 (Containers and lining for waste), Photo 12 (Different types of segregated waste in all types of containers including cardboard boxes and plastic containers/notice storing in the same place of the waiting area for the general public), Photo 13, 14 (Pathological and infectious segregated waste in red bags and cardboard boxes stored in inadequate places/notice no leak proof containers and lack of labeling), Photo 15 (Dispensary entrance), Photo 16, 17, 18 (Pharmacy/notice the very poor housekeeping/notice mixed of expired and not expired materials), Photo 19 (Radiology entrance), Photo 20 (Bio hazard signal), Photo 21 (Container and lining for x-ray films/notice black lining), Photo 22 (X-ray films development area), Photo 23, 24 (Disposal of x-ray films development waste chemicals in the sink), Photo 25 (X-ray films development chemicals), Photo 26, 29, 30 (Old vehicle for final storage of all types of wastes/notice high leaking risk), Photo 27, 28 (Poor housekeeping in the final storing place/notice used syringes dumped on the floor), Photo 31 (Morgue corps table), Photo 32 (Morgue freezer/notice all kinds of pathological and infectious waste kept for several months), Photo 33 (Incinerator overview), Photo 34 (Incinerator combustion chamber), Photo 35, 36 (Incinerator combustion chamber ashes/notice final disposal in open hospital area), Photo 37 (Incinerator fuel gas tank/notice poor maintenance), Photo 38 (Waste hospital bed), Photo 39 (Administration entrance), Photo 40 (Sharps containers).

4. The incinerator is operated and maintained by personnel who have not received proper training. Incinerator operators should be further trained and the training should be conducted in the training of trainers approach so that other people can also take advantage of the training.

5. The operation of the incinerator requires also special consideration regarding air pollution problems caused by the poor combustion procedures and the low stack. An appropriate training of the incinerator operators is recommended, since those installations represent a high capital investment and could be very costly to be operated and maintained if they are not properly managed (see photo 33, 34).
6. Although the waste handling and management personnel try to apply a colored coded segregation of waste, there is a severe shortage of colored bags in the market. It is not possible to obtain the different colors lining for the adequate segregation and storage.

7. No adequate personal clothing or protective equipment is used by the persons involved in the handling of the different types of wastes.

8. The typical color code segregation of waste is not working. Not typical colored bags are being used for lining pathological and infectious waste (see photo 5, 8, 10).

9. Non adequate training has been given to the staff involved in waste handling and management, and the waste handling and management staff does not have job descriptions detailing their tasks.

10. Full bags containing both pathological and infectious waste are stored sometimes in non adequate storage places in the hospital without any proper labeling or identification (see photo 12, 13, 14).

11. No adequate and consisting labeling is used to identify the containers and lining used for segregation and storage of the different types of waste. No typical color code full bags containing pathological and infectious waste can be observed inside the hospital without any labeling (see photo 7, 11, 13, 14).

12. The incinerator combustion chamber ashes are not finally disposed. They are stored and wrongly disposed in open areas inside the hospital property. As a consequence the ashes are blown by the wind causing air pollution problems in the hospital premises since they are inhaled by the same hospital’s workers (see photo 35, 36).

13. Pathological wastes are frozen and kept without final disposal, for very long periods of time (more than 3 months), with the implied severe sanitary and infectious risks (see photo 31, 32).

14. No proper and sufficient containers are available for the lining used for waste segregation at the different sources inside the hospital (see photo 12, 13, 14).

15. According to the WRH hospital’s officials interviewed there is an infection control problem in the hospital in contradiction with the hospital’s policy which is “to get people cured and not ill or infected” (see photo 12).

LOMA LUZ HOSPITAL
(LLH)

LLH (see photographic attachment) has “hospital infection control manual” which includes transmission precautions, hand hygiene, barrier protection, and waste handling and
management guidelines. The “Disposal of Medical Waste” section classifies medical waste in sharps and hazardous waste. Sharps include needles, syringes with needles, blades, stylets, catheters and lancets. The segregation of medical waste should be done at source. General waste should be lined in green bags and in containers with green labels. General infectious should be segregated in containers with red bio hazard labels and red lining. Pathological should be segregated in containers with yellow plastic lining. Sharps should be placed in rigid, leak proof containers. The plan also provides collection of waste guidelines.

**Main Conclusions and Recommendations:**

The attached photographic composition illustrates waste handling and management in LLH as follows: Photo 1 (LLH entrance), Photo 2 (Initial meeting), Photo 3, 6 (Container and lining for waste), Photo 4 (Diagnostic imaging entrance), Photo 5 (Ultrasound entrance), Photo 7, 9 (Container and lining for general), Photo 8 (General practitioner office), Photo 10 (Container for sharps), Photo 11, 12 (Container and lining for pathological), Photo 13 (Laboratory entrance), Photo 14, 15 (Container and lining for laboratory waste), Photo 16, 17, 18 (Container and lining for pathological and infectious waste), Photo 19 (Emergency room entrance), Photo 20, 21 (Segregated general waste), Photo 22 (Container and lining for pathological), Photo 23 (Pharmacy entrance), Photo 24 (Sharps container), Photo 25, 26 (Container and lining for placenta and umbilical cord), Photo 27 (Rigid containers and lining), Photo 28, 29, 30 (Open burning incineration place/notice unburned material in the ashes), Photo 31 (Open burning area/notice closed house affected by air pollution), Photo 32 (Location of the open burning area related to the hospital building from where the picture was taken/notice wind direction from the incineration spot to the hospital building which creates air pollution problems).

1. Open burning and burying is used for finally disposing waste. This take place approximately 300 m. far from the hospital building. The burning process does not reach the proper temperature for adequate final disposal of the waste. Besides that, it produces a severe air pollution problem in the hospital area which affects mainly the same hospital workers (see photo 28, 29, 30, 31, 32).

2. Although the LLH management is willing to partner with the Regional Hospital to adequately incinerate waste through the payment (of an affordable fee) for this service from the second hospital, this agreement has not been reached.

3. Because of shortage in the market no typical color code bags are used for waste lining. Different colors are used (see photo 3, 6, 7, 9, 11, 12, 14, 15, 16, 17, 18).
SAN IGNACIO HOSPITAL
(SIH)

SIH (see photographic attachment) is both a sub district and specialist hospital. It offers 22 beds/day; 4 inpatients/day and 100 outpatients/day. The different wards include: Male ward, female ward, maternity and pediatric.

SIH produces general, pathological, radioactive, chemical, infectious, sharps and pharmaceutical waste.

Main Conclusions and Recommendations:

The attached photographic composition illustrates waste handling and management in SIH hospital as follows: Photo 1 (SIH entrance), Photo 2 (Initial meeting), Photo 3 (Nurse Station), Photo 4 (Sharps container), Photo 5 (Handmade cardboard box used as rigid container for sharps), Photo 6, 7 (Container and lining for waste/notice mixed of all types of waste including sharps, pathological and infectious waste), Photo 8 (Emergency entrance), Photo 9, 10 (Handmade cardboard box used ad rigid container for sharps), Photo 11, 12, 13, 14, 15, 16 (Open storage place used for all types of waste including sharps, pathological and infectious/notice storing place is accessible to the general public), Photo 17 (Morgue corps table), Photo 18 (Pit latrine used for finally disposing placentas), Photo 19 (Container and lining with a mixed of all types of waste including general pathological and infectious), Photo 20 (Hospital supporting columns/notice poor maintenance and deterioration), Photo 21 (Incinerator overview), Photo 22 (Incinerator combustion chamber/notice the chamber is new without any use), Photo 23 , 24, 25 (Waste open dump overview), Photo 26, 27, 28 29 (Open dump section for hospital waste open burning/notice handling of hospital waste without any protection clothing and equipment).

1. Full containers and bags with both pathological and infectious waste are stored in non adequate storage places in the hospital without any proper labeling or identification. This is an open storage place and it is used for all types of waste including sharps, pathological and infectious. It is completely accessible to the general public, with the consequent high risk infection (see photo 11, 12, 13).

2. There is an incinerator installed in the Municipal waste dump, especially for adequate incineration of the hospital health care waste. However, the incinerator is not operating at all. Although the incineration was installed eight years ago, the combustion chamber has never been used and looks completely new (see photo 21, 22).

3. Open burning is used for finally disposing the SIH hospital waste. This takes place in the Municipal dump. The burning process does not reach the proper temperature for adequate final disposal of the waste. Besides that, it produces a severe air pollution problem in the area which affects the whole population (see photo 23, 24, 25, 26, 27, 28, 29).
4. The placentas are wrongly finally disposed in a pit latrine inside the hospital property, which is poorly maintained and disinfected (see photo 19). The pit is full and bad smells produce air pollution. No signals and labeling at all are used to identify this place and the health risk present.

5. The color code segregation of wastes is not working. No typical color bags are used for segregating pathological and infectious wastes (see photo 6, 7, 19).

6. No adequate personal clothing or protective equipment is used by the persons involved in the handling of the different types of wastes. Most critical is the handling of waste for open burning in the dump (see photos 27, 28). In this place the handlers (driver and attendant) manipulate all types of waste (pathological, infectious sharps) without any proper protection.

**SOUTHERN REGIONAL HOSPITAL (SRH)**

SRH (see photographic attachment) has a “Medical waste management plan”. Types of medical waste include: Red waste (blood related, chemically related, or hazardous), green waste (regular garbage and solid waste), and sharps (needles, syringes, razor blades, etc.). Standard operating procedures include segregation, waste containerization and storage, waste handling and transportation, waste treatment, waste disposal, emergency response, safety measures, control, clean up and documentation. Segregation is to be done at source into red, green and sharps. Red should be placed in red containers lined with red bags; green waste in green or ordinary containers lined with green bags; sharps in puncture proof and leak proof containers. All personnel handling waste should be supplied with personal and protective equipment. Red waste and sharps should manually loaded to a trolley and never be compacted. Red waste and sharps, including the red box and the sharp containers should be treated by incineration at high temperatures to ensure this destruction. The remaining ash should be disposed off at the garbage dump.

**Main Conclusions and Recommendations:**

The attached photographic composition illustrates waste handling and management in PGH as follows: Photo 1 (Clinic No. 1 – General Medicine Entrance), Photo 2 (Dressing Room), Photo 3 (Containers for sharps), Photo 4, 5 (Container and black lining for waste/notice mix of general pathological and infectious), Photo 6 (Laboratory entrance), Photo 7 (Container for sharps), Photo 8 (Container and green lining for waste/notice mix of general, pathological and infectious), Photo 9, 10 (Container and green lining for waste/notice mix of general, pathological and infectious/notice waste dumped out of the container), Photo 11, 12, 13, 14 (Container for sharps), Photo 15 (Container and lining for waste/notice mix of general, pathological and infectious waste), Photo 16 (Container and black lining for general waste), Photo 17 (X-Ray entrance), Photo 18 (X-Ray development equipment), Photo 19 (X-Ray development chemicals), Photo 20, 21 (Container for waste/notice lack of lining; mix of general and infectious), Photo 22 (Labor room), Photo
23 (Container and green lining for waste/notice mix), Photo 24 (Container for sharps),
Photo 25 (Female patient unit entrance), Photo 26 (Doctors station), Photo 27, 28
(Container and green lining for waste/notice mix of general, pathological and infectious),
Photo 29, 30 (Container and black lining for waste/notice mix of pathological and
infectious), Photo 31 (Container for sharps), Photo 32, 33 (Nurse station), Photo 34, 35
(Container and green lining for waste/notice mix), Photo 36 (Scotiabank Pediatrics), Photo
37, 38 (Container and green lining for waste/notice mix), Photo 39 (Morgue entrance),
Photo 40, 42 (Accumulation of full bags of all types of waste during the last month in the
morgue), Photo 41, 43 (Morgue freezer/frozen waste inside morgue freezer), Photo 44, 45
(Open cardboard box container used for segregating sharps, pathological and infectious),
Photo 46 (Incinerator overview), Photo 47 (Incinerator manufacturer information), Photo
48 (Incinerator combustion chamber), Photo 49, 50 (Burying place for accumulated not
incinerated lined waste).

1. The document containing the medical waste management plan is considered to be
adequate and comprehensive but its present application is very limited.

2. There is an incinerator installed especially for adequate incineration of the hospital
health care waste. However, the incinerator has not worked for the last month because
of operation and lack of training problems (see photo 46, 47, 48). Given the mentioned
incinerator operation problems, all types of waste are being buried without any
adequate treatment (see photo 49, 50).

3. Due to supply reasons, the color code segregation of wastes is not working. No typical
color bags are used for segregating general, pathological and infectious wastes (see
photo 4, 5, 8, 9, 10, 20, 21, 23, 27, 28, 29, 30, 34, 35, 37, 38).

4. No sufficient and adequate rigid containers are being used for segregation of sharps.
Big amounts of sharps (used syringes and needles) are segregated in completely open
cardboard boxes, and mixed with other infectious and pathological waste and finally
stored in the morgue with a very high infectious risk for everybody (see photo 44, 45).

5. Although there is some segregation, all the different types of waste (general,
pathological, infectious, sharps) are mixed for final disposal, overloading the
incineration process (see photo 40, 41, 42, 43).

6. Because of the non operational incineration process, all types of waste from the hospital
(apart from the ones produced in the restaurant) are being buried without any minimal
adequate treatment. Some neighbors have taken pictures of this process in the hospital
property to complain against the operation of the institution (see photo 49, 50).

7. The SRH does not have an adequate storage room where to store lined waste previous
to incineration. Because of this reason the morgue is being misused for this purpose
(see photo 40, 41, 42, 43, 44, 45).
8. The operation of the incinerator requires special consideration. Because of very poor segregating practices, all types of waste are being incinerated, and the incinerator is being overloaded. This produces waste of fuel and operational time. The incinerator is operated and maintained by hospital personnel who have not received proper training. Incinerator operators should be further trained and the training should be conducted in a “training of trainers” approach so that other people even from other hospitals and regions can also take advantage of this training. When working the incinerator operates every other day so intermediate storage is needed. Everyday incineration could lead to no need of this intermediate storage. Scale economies could be implemented, offering incineration services to third parts (see photo 40, 41, 42, 43, 44, 45).

9. The operation of the incinerator requires special consideration regarding the final disposal of wastes taken for incineration. The accumulation of these types of waste (pathological, infectious, etc) in the morgue is a very serious sanitary hazard (see photo 40, 41, 42, 43, 44, 45).

PUNTA GORDA HOSPITAL
(PGH)

The attached photographic composition illustrates waste handling and management in PGH (see photographic attachment) as follows: Photo 1, 3 (PGH entrance), Photo 2 (Initial meeting), Photo 4 (Public Health Clinic), Photo 5 (Container for sharps), Photo 6, 7, 10 (Container without any lining for pathological and infectious waste segregation), Photo 8 (Container and lining for waste), Photo 9, 11 (Locally made container for waste segregation), Photo 12 (Out-patient clinic entrance), Photo 13, 14, 15, 16 (Container without any lining for disposing all types of waste at the out-patient clinic), Photo 17 (Laboratory entrance), Photo 18, 19 (Container and lining for all types of waste), Photo 20 (Hospital main hall), Photo 21 (Container and lining for all types of waste), Photo 22 (Pharmacy expired drugs/notice absence of container), Photo 23, 24 (Waste handler/notice absence of any protective clothing and equipment), Photo 25, 27 (Open storing place for all types of waste), Photo 26 (Sharps dumped on the floor in the open storing place for waste), Photo 28 (Incinerator overview), Photo 29, 31 (Different types of waste accumulated for incineration), Photo 30, 32 (Incinerator combustion chamber), Photo 33 (Waste storage room for collection by the Municipality/notice contradiction with the “keep PG clean” signal).

Main Conclusions and Recommendations:

1. Because of shortage financial resources, no adequate and sufficient lining at all is being used for waste segregation at source (see photo 6, 7, 10, 13, 14, 15, 16). Some locally made containers are also being used for the same purposes (see photo 9, 11).

2. The final waste storage room for collection by the Municipality is falling apart (see photo 33). All types of waste (general, pathological, infectious, sharps) are removed and
spilled (probably by dogs) all over the place which is accessible to the general public and hospital workers.

3. Although there is some at source segregation process working properly, all the different types of waste (general, pathological, infectious, sharps) are mixed for final disposal (see photo 7, 10, 13, 15, 16, 19, 33).

4. No adequate personal clothing or protective equipment at all, is used by the persons involved in the handling of the different types of wastes (see photo 23, 24).

5. There is an incinerator installed especially for adequate incineration of the hospital health care waste (see photo 28, 30, 32). However, the incinerator is not operating at all a year ago. Infectious and pathological waste is being taken to Dangriga for burying given that the incinerator is useless.

6. All types of health care waste from the hospital are finally disposed by the Municipality including general, pathological, infectious, sharps.
2. GUIDELINES AND RECOMMENDATIONS FOR THE IMPROVEMENT OF THE MEDICAL WASTE MANAGEMENT IN BELIZE

The following guidelines and general recommendations are established to improve the management of medical waste in the public and major private hospitals in Belize:

1. In the hospital facilities where a document containing a medical waste management plan does exist, the application should be reinforced. The hospitals which have not adopted a plan, should have and apply a minimal hospital waste management plan and guidelines for the handling, storage, and disposal of medical and related wastes. The use of the manual “Safe Management of Wastes from Health Care Activities” WHO 1999 is recommended.

2. In general terms, the color code segregation of wastes is not working in most of the hospitals assessed. Black, green and other color bags are used for segregating pathological and infectious wastes. Red bags are not generally used due to supply difficulties in the market. It is recommended that clearer definitions of the categories of waste should be adopted by the hospitals where they do not exist and applied. The color coded and labeled container and storage system must be reinforced and strictly followed to facilitate the segregation of medical wastes.

3. Most of the institutions have no estimated quantities of the different types of solid wastes produced or the total volume. It is recommended that quantification storage of solid waste produce an estimated quantity is undertaken.

4. In the hospital facilities where there is not a responsible person, the waste management coordinator should be appointed and further trained, and the training should be conducted using the “Training of Trainers” approach so that other people can also take advantage of this training. The training programs should be appropriate for the different skill levels of the personnel working at these health care facilities, including the medical staff, the nurses, the domestics, the caretakers, and the housekeeping personnel. The personnel involved in handling must be taught the right procedures for lifting wastes bags and containers. Where necessary, the adequate protective and safety uniforms and equipment should be worn.

5. The poor housekeeping and handling of wastes found in the incineration places in most of the hospital assessed, where spilled sharps, pathological and infectious wastes causes high sanitary risk for handlers, employees and the general public should be solved.

6. All the incinerators in the hospitals assessed are operated and maintained by hospital personnel who have not received proper training. Incinerator operators should be further trained and the training should be conducted in the “training of trainers” approach so that other people can also take advantage of this training. For these purposes, it is recommended to contact Eng. Antonio Hernández, from PAHO Headquarters in Washington, D.C.

7. In the hospital facilities where it does not exist, a final storage location for the health care wastes should be designated preferably outside the establishment, if possible. The wastes in bags or containers should be stored in a separate area or
room of a size appropriate to the final containers size, the quantities of wastes produced, and the frequency of collection. The final storage area should have, if possible, an impermeable, hard standing floor with good drainage. It should be easy to clean and disinfect. It should afford easy access for the handling of wastes. Both, the final containers and the area should be locked to prevent access by unauthorized persons. It should have easy access for waste collection vehicles, protection from the sun, and it should be inaccessible for animals, insects and birds. There should be good lighting and at least passive ventilation. The area should not be located in the proximity of restaurants or fresh food stores. A supply of clean equipment, protective clothing and waste bags or containers should be located conveniently close to the area. Adequate signals and labeling to identify the final storage room location and the storing of healthcare waste in this place should be implemented. Adequate handling of wastes and housekeeping practices must be implemented in the final storage area.

8. In most of the hospital assessed, the “waste team” should receive adequate training in health care waste handling and management.

9. In all the facilities where an incinerator is installed, the operation requires special consideration regarding high cost of gas fuel and air pollution problems caused by the poor combustion procedures, overloading, and the low stack. Appropriate combustion processes and no overloading must be implemented, since those installations represent a high capital investment and could be very costly to be operated and maintained if they are not properly managed.