ENVIRONMENTAL PROTECTION DEPARTMENT ANNUAL REPORT

2014

ENVIRONMENTAL PROTECTION DEPARTMENT

EXECUTIVE SUMMARY

The Environmental Protection Department (EPD)'s mission is to preserve and improve Barbados' quality of life and its natural and built environment, through the promotion of sustainable practices, education, partnerships, and the enforcement of legislation. The Department has eight sections; seven technical and one administrative.

In July 2014, the computer server crashed resulting in the loss of a significant number of reports and other documents which had to be rewritten. This resulted in delays in the completion of some activities.

The Department received fifty-nine (59) complaints related to ambient (outdoor) air quality and fifteen (15) complaints related to indoor air quality. With regards to ambient air quality complaints, the majority of complaints pertained to nuisance emissions and vehicle maintenance facilities (VMFs).

Other activities carried out relating to the management of air pollution involved the revision to the draft ambient air policy paper, finalisation of the Bridgetown ambient air quality report and the implementation of the ambient air quality assessment of Oistins and Speightstown among others. As it relates to noise pollution, the report for the Bridgetown Noise Characterisation Study was completed.

The EPD received one thousand six hundred and fifty-one (1,651) building development applications in 2014 with the majority being residential. One thousand five hundred and thirty-one (1,531) applications were brought forward from 2013. One thousand six hundred and eight-two (1,682) applications were processed in 2014 with the majority being approved (81%).

Inspections were undertaken in response to applications that were approved with conditions. Forty-two (42) primary wastewater treatment systems were inspected during the period under review.

The review of six of the Regulations under the Health Services Act (CAP. 44) was undertaken during 2014 and comments were to be compiled into a report in 2015.

In 2014, one hundred and seven (107) buildings were identified as being derelict. Forty–five (45) buildings were removed and three sites were cleared during 2014 for $ 183,007.51.

The Derelict Vehicle sub-programme has been suspended due to the absence of a government-sanctioned disposal facility for the derelict vehicles.

Twenty (20) development-related documents were received by the Department and twenty-five (25) sets of comments were sent to the Town and Country Development Planning Office.

Eleven (11) marine-related complaints were received mainly as a result of oil pollution and the discharge of wastewater. Ten (10) of those complaints were investigated and one (1) was referred to another agency.

The main component of the National Marine Litter Programme was executed on September 20, 2014, for International Coastal Clean-up Day. Five thousand seven hundred and thirty-one (5,731) items were collected from EPD's adopted beach and weighed four hundred and sixty-one (461) pounds (lbs).

A work plan was developed for the National Oil Spill Response Committee and the inventory of oil response equipment and contact information was updated.

Concerning the regulation of solid waste and hazardous materials the following activities were conducted:

- eleven (11) inspections of the four waste disposal sites operated by the Sanitation Service Authority,
- six (6) investigations into complaints,
- processing of forty-five (45) requests for disposal advice on hazardous and special waste,
- processing of thirty-two (32) applications for permission to import radioactive materials into Barbados and
- reviewed and made recommendations for approval of thirty-five (35) pesticide applications.

Concerning multilateral environmental agreements, the Department undertook activities aimed at implementing the various conventions. This included assisting with the drafting of a cabinet paper which was approved by Cabinet on August 21, 2014, for Placing Mixtures and Preparations Containing Polychlorinated Biphenyls (PCBs) on the Import and Export Licensing System. This activity was outlined in the National Implementation Plan for the Stockholm Convention.

A total of one thousand nine hundred and fifty-seven (1,957) samples were collected under the Nearshore Monitoring Program in 2014. Of these, eight hundred and twelve

(812) samples were collected from the West Coast Beaches while one thousand one hundred and forty-five (1,145) samples were collected from the South Coast. Most of the beaches were compliant with the ambient standards of the proposed Marine Pollution Control (Discharge) Regulations. Coach House beach in February was the only beach in 2014 that exceeded the Enterococci standard of thirty-five (35) colony-forming (CFU)/ 100 ml).

All of the beaches exceeded the proposed standard for total phosphorous (0.015 mg/L) and turbidity (1.5 NTU). All beaches were in compliance with respect to the pH standard however the majority of them exceeded the standard with respect to Total Suspended Solids (TSS) and the total nitrogen standard of 0.1 mg/L.

Data verification and database management programme was conducted to ensure the accuracy of the monitoring data stored in the various databases. The biannual widescreen groundwater monitoring programme was conducted and most of the substances analysed for were either not detected or below the World Health Organization (WHO) guideline values. Only one set of samples was collected during this period.

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DEPARTMENTAL OVERVIEW

The mission of the Environmental Protection Department (EPD) is to preserve and improve Barbados' quality of life and its natural and built environment, through the promotion of sustainable practices, education, partnerships and enforcement of legislation.

The Environmental Protection Department is responsible for the monitoring and control of water quality (groundwater and nearshore), airborne contaminants, sound levels and the prevalence of derelict buildings and derelict vehicles. The Department ensures proper building development, disposal of solid waste and adequate management and control of hazardous materials inclusive of wastes. The Department develops and implements measures geared at the effective coordination and planning for emergency incidences such as oil spills or hazardous chemicals spills. The EPD also develops and participates in environmental initiatives aimed at educating the public about environmental issues.

Table 1 below shows the structure of the Department.

TABLE 1: STRUCTURE OF THE DEPARTMENT

No.	Section	No. of Posts
1.	Management	2
2.	Administration	14
3.	Air & Noise Pollution Control	4
4.	Building Development Control	14
5.	Derelict Buildings & Vehicles	4
6.	Environmental Technical Officers	3
7.	Marine Pollution Control	4
8.	Management of Solid Waste & Hazardous Materials	2
9.	Water Quality Management	3
	Total	**50**

1 AIR AND NOISE POLLUTION CONTROL

The Air and Noise Pollution Control Section (ANPCS) manages issues related to air and noise pollution. Specifically, the ANPCS conducts research and investigates complaints related to outdoor (ambient) air and noise pollution. The section also develops public education initiatives and policy documents.

In 2014, the ANPCS was staffed by three persons: one Senior Environmental Technician and two Environmental Technicians. There is also a vacant Environmental Technician post.

The subsequent section describes those activities conducted during 2014 concerning ambient air pollution, indoor air and noise pollution as well as projected activities.

1.1 AMBIENT AIR POLLUTION

The ANPCS carries out activities relates to the management of ambient air quality in Barbados. These activities include the investigation of complaints, development of policies and conducting of research.

1.1.1 RECEIPT AND RESPONSE TO COMPLAINTS

In 2014, the ANPCS received fifty–nine (59) complaints related to ambient (outdoor) air pollution. Ambient air pollution complaints fall into the following categories:

- Industrial stacks e.g. emissions from stacks,
- Manufacturing operations,
- Nuisance e.g. chemical odours, agricultural spraying, dust from construction activities and
- Vehicular maintenance facilities (VMFs) e.g. auto-body repair activity.

The majority (49 %) of the complaints were related to nuisances followed by VMFs with 39% (Figure 1). Nuisance complaints include those activities which result in fugitive emissions such as construction activities. It is a broad category which encompasses several sources which may account for it being the largest category of complaints.

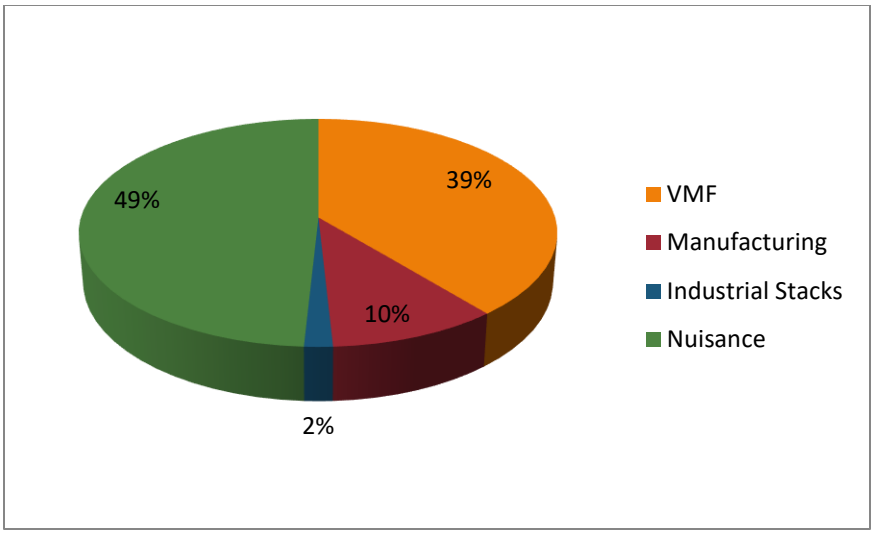

FIGURE 1: DISTRIBUTION OF COMPLAINTS BY CATEGORY

Complaints are also classified as new or recurring with the latter being those which have been lodged with the Department on a previous occasion. More than half (63.5 %) of the complaints were classified as new and 36.5 % were recurring.

Sixty-one (61) investigations or related meetings were carried in 2014, fifty-two (52) of which were new investigations.

Figure 2 below shows that the majority of complaints investigated during 2014 were related to vehicle maintenance facilities followed by nuisance complaints. It also shows that the majority of complaints investigated were new complaints.

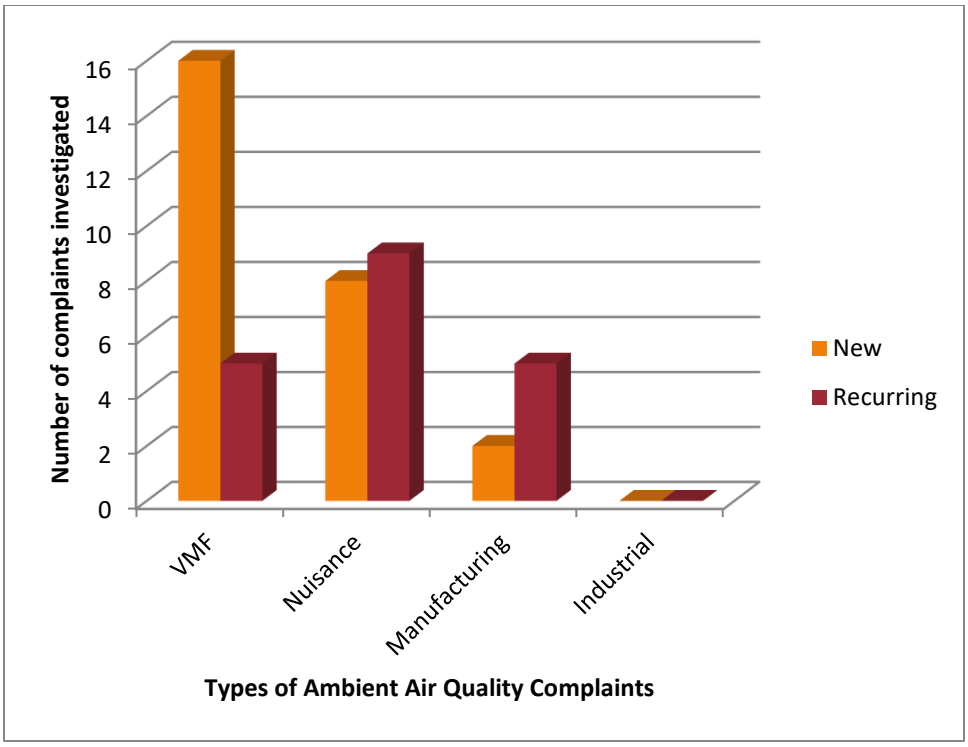

FIGURE 2: NUMBER OF COMPLAINTS BY TYPE AND CLASSIFICATION

A review of the last five years shows that there was a significant increase in the total number of complaints received between 2013 (35) and 2014 (59) which was an increase of just under seventy per cent (68.6 %) (Figure 3).

Over the past two years, there has been an increase in the number of nuisance complaints lodged at the department. However, VMFs remained a significant category over the past five years.

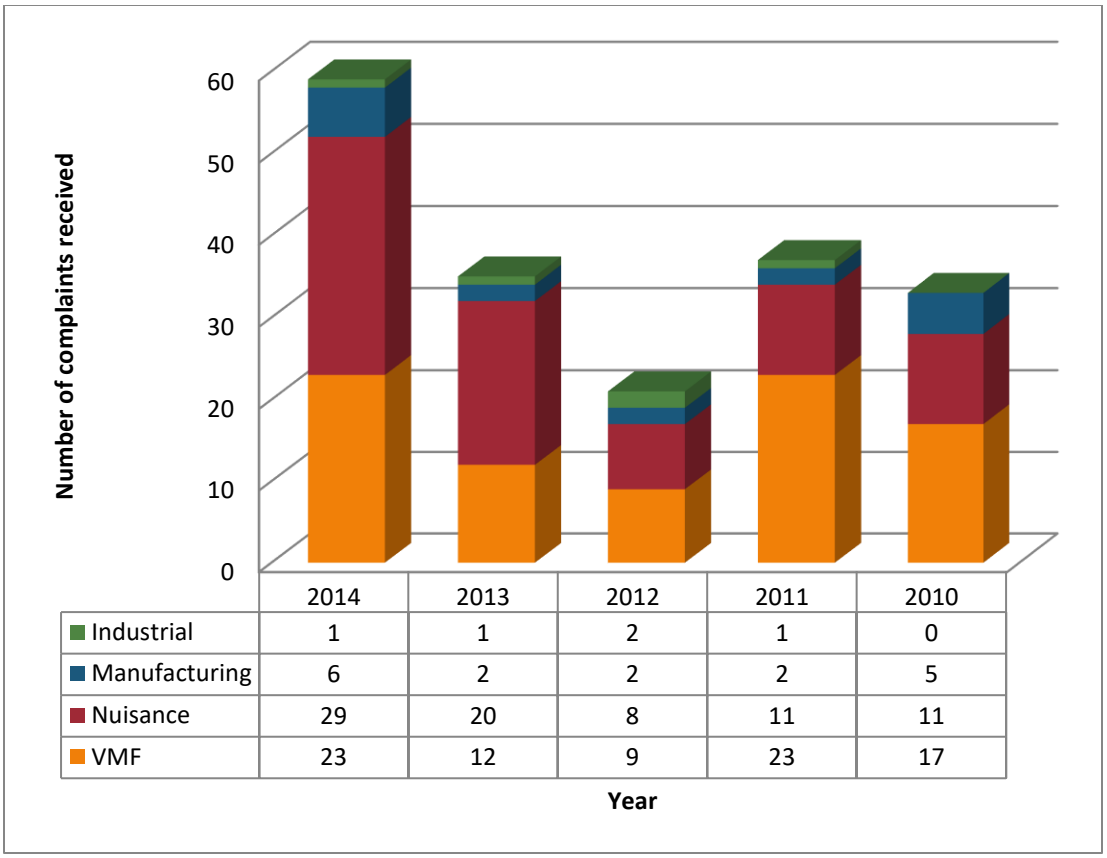

FIGURE 3: TOTAL NUMBER OF AIR QUALITY COMPLAINTS RECEIVED OVER THE PERIOD 2010-2014

1.1.2 REVISION OF THE AMBIENT AIR POLICY PAPER

The Ambient Air Policy Paper describes the major issues related to ambient air pollution. It describes the major sources of air pollution in Barbados, the existing legal and regulatory framework and suggests a management framework to effectively management ambient air quality.

As noted in the 2013 Annual Report, the Ambient Air Quality Policy Paper was submitted to the Ministry of Environment and Drainage. However subsequently comments were received from the Ministry of Labour and revisions were made to the document to reflect these comments.

1.1.3 AMBIENT AIR QUALITY ASSESSMENT OF BRIDGETOWN

The Ambient Air Quality Assessment in Bridgetown involved the sampling of outdoor air using passive monitors at selected locations in Bridgetown. The air samples were

analysed for sulphur dioxide, ozone, nitrogen dioxide, and volatile organic compounds (VOCs). These substances in sufficient quantities can harm human health.

During the third quarter of 2014, the final report which was lost due to the failure of the departmental server was re-written. Internal review of the document was carried out in the final quarter of 2014 for onward submission to the Ministry of Environment and Drainage in early 2015.

1.1.4 AMBIENT AIR QUALITY ASSESSMENTS OF OISTINS AND SPEIGHTSTOWN

The Ambient Air Quality Assessment of Oistins and Speightstown consisted of the sampling of outdoor air at selected locations. Sampling sites consisted of three locations each at Oistins and Speightstown and one at the background site at Ragged Point. As with the Bridgetown project, the samples were analysed for criteria pollutants and VOCs.

Sampling commenced in September 2013, concluded in August 2014 and the development of the report has subsequently commenced.

1.1.5 AMBIENT AIR QUALITY ASSESSMENTS OF HOLETOWN AND TWO RURAL LOCATIONS

As part of the continued effort to determine the level of air contaminants present in the Barbadian environment, the Department will embark on an air quality assessment of Holetown and two rural locations (Gun Hill, St. George and Farley Hill, St. Peter).

The passive samplers to be used in the assessment were purchased in 2014. The sampling at the various locations will commence in early 2015.

1.2 INDOOR AIR POLLUTION

As noted in the 2013 Annual Report the Department ceased investigating indoor air quality complaints. Instead, the EPD has focused on the revision of the draft Indoor Air Quality Policy Paper and a guidance document on indoor air quality.

1.2.1 REVISION OF THE INDOOR AIR QUALITY POLICY PAPER

The purpose of the Indoor Air Quality Policy paper is to define the way forward for the management of Indoor Air Quality issues in Barbados. It describes the impact of air pollutants in the indoor environment and the current management of indoor air quality issues.

Due to the submission of comments from the Labour Department, the IAQ Policy Paper was updated to reflect these comments.

1.2.2 GUIDANCE DOCUMENT ON INDOOR AIR QUALITY

This document contains information that would be helpful for building managers with the view of providing a healthy environment for building occupants. It contains information about pollutants, sources and the mitigation measures to be employed to reduce the negative impacts of pollutant releases on human health.

The revision of the document was completed in 2014 having previously been developed around 2006. However, due to the crash of the computer server, the document has to be redone.

1.3 NOISE POLLUTION

The main activities of the section were focused on the response to complaints and the finalization of the Bridgetown Noise Characterization Study.

1.3.1 RECEIPT AND RESPONSE TO COMPLAINTS

During 2014, the ANPCS received fifteen complaints with six recurring complaints. Seventeen (17) noise investigations were conducted with five (5) classified as new and twelve (12) as recurring. The noise complaints investigated involved barking dogs, a compressor and loud music.

1.3.2 BRIDGETOWN NOISE CHARACTERIZATION STUDY

The goal of this study was to determine the sound levels emitted at various locations in Bridgetown. It involved the deployment of a sound level meter on the rooftops of the selected buildings and collection of qualitative data e.g. source activities and traffic count data.

The report for the Bridgetown Study was completed during the year, however, it had to redone due to loss of information when the server crashed.

1.4 LOOKING FORWARD

In 2015, the ANPCS will commence sampling and the other activities for the ambient air quality assessment of Holetown and two rural locations project. The noise assessment of Holetown and two rural locations is to be carried out in 2015 as well. The report on the ambient air quality assessment of Oistins and Speightstown is set to be completed during the year.

The Department will be evaluating the procurement of a Thermo Scientific 146i multi-gas analyser to enable the undertaking of active sampling of ambient air. The active sampling of ambient air would allow for the comparison of sampling results with ambient air

quality standards such as US National Ambient Air Quality Standards or the World Health Organization Standards.

2 BUILDING DEVELOPMENT CONTROL

The main activities performed by the Building Development Control Section (BDS) were related to the processing of building development applications, providing feedback on consultation files submitted to the Department, inspecting facilities for conformance with conditions of approval and conducting a comprehensive review of selected Health Services Regulations.

The staff complement for the BDS is shown in Table 2 below.

TABLE 2: BUILDING DEVELOPMENT CONTROL POSTS

Post	Established Posts	Filled Posts
Chief Building Development Officer	1	1
Senior Building Development Officer	2	2
Building Development Officer	8	8
Building Development Inspector	2	1
Draughtsman Technician	1	1
Clerk/Typist	2	2
Clerical Officer	1	1
Environmental Inspector	1	0
Total	18	16

2.1 PROCESSING APPLICATIONS

Building applications are processed according to the Health Services Act CAP. 44 and Regulations, the Groundwater Protection Zoning Policy, the Marine Pollution Control Act CAP. 392A, Cabinet decisions and various international codes and standards. Applications are received from the Town and Country Development Planning Office (TCDPO) as well as from applicants who apply directly to the EPD. These applications, when vetted by the BDCS, are approved, refused, approved with conditions or in some cases acknowledged or withdrawn when the particular application does not fall under the purview of the Health Services (Building) Regulations or if the applicant no longer wishes to pursue the development.

In 2014, the BDCS received one thousand six hundred and fifty-one (1,651) applications while one thousand five hundred thirty-one (1,531) applications were brought forward

from 2013. Figure 4 below shows that the majority (89 %) of applications received during 2014 were residential followed by commercial applications (10%).

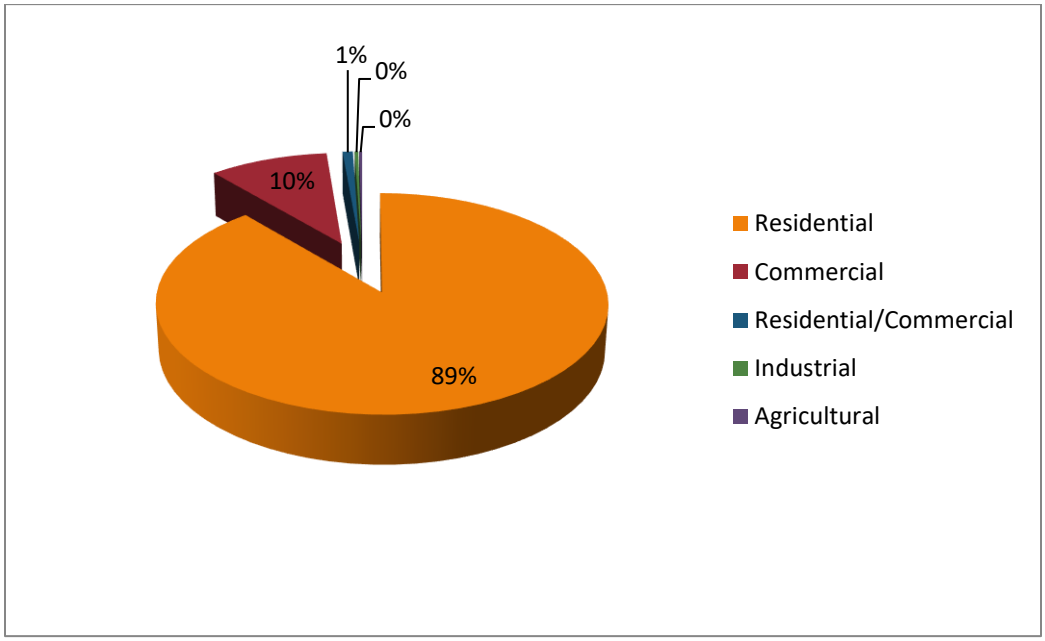

FIGURE 4: TYPES OF APPLICATIONS RECEIVED IN 2014

Sixteen hundred and eighty–two applications (1,682) were processed in 2014. Table 3 below shows that the majority (81 %) of decisions made on applications were approvals with less than 6% being refused.

TABLE 3: TYPES OF DECISIONS MADE FOR PROCESSED APPLICATIONS

Type of Decision	No. of applications
Approved	1,369
Approved with conditions	181
Refused	99
Acknowledged	14
Withdrawn	19
TOTAL	**1,682**

Since 2010, there has been a downward trend (Table 3) in the number of applications submitted to the EPD. This downward trend may be linked to the downturn in the economy.

TABLE 4: NUMBER OF BUILDING DEVELOPMENT APPLICATIONS RECEIVED BY YEAR

Year	No. of building applications
2010	2,264
2011	2,013
2012	2,008
2013	1,762
2014	1,651

The unusual number of brought forward files was occasioned by several factors namely; a thirty-seven per cent (37%) staff replacement meant that incoming staff had to be trained, and this affected the output. Secondly, there were unfilled posts that proceeded this period resulting in a back-log which carried over from previous periods which would have resulted in less output in 2014.

Due to the crash of the server and loss of the electronic database system, officers were forced to revert to a manual system of recording, retrieval and storage of applications which is more time consuming and less efficient.

2.1.1 CONSULTATIONS

During 2014, thirty-nine (39) consultation files were received from TCDPO and other entities including ministries and governmental departments. At the end of 2014, comments were submitted on thirty-four (34) files and responses to five were pending. Under the Town and Country Development Planning Act CAP 240, the Chief Town Planner is required to consult with respective agencies on health, agriculture and road issues before rendering a decision. The EPD receives consultation files in that regard and reviews these against health and environmental legislation and policies. Some of these consultation files included proposed construction of wind turbines, concrete batching plants and renovations to petrol stations to name a few.

2.2 INSPECTIONS

Inspections are undertaken for applications which were approved with conditions. For instance, applications with wastewater treatment facilities are inspected to ensure that the facilities which are constructed comply with the conditions of approval.

2.2.1 INSPECTIONS OF SEPTIC TANKS AND FILTER BEDS

In 2014, thirty-nine (39) septic tanks and three (3) filter beds were inspected. The majority (69.2 %) of the septic tanks and 100 % of filter bed inspections were found to be satisfactory.

2.2.2 INSPECTIONS OF COMMERCIAL, INDUSTRIAL AND INSTITUTIONAL BUILDINGS

The BDCS conducted inspections of commercial, industrial and institutional buildings namely:

- Barbados Water Authority, Pine, St. Michael
- National Housing Corporation housing units, Dalkeith, St. Michael
- Radnor Birthing Clinic, **Pine** Road, St. Michael

An insufficient staff complement also hampered the ability of the Building Development Section to verify compliance with conditions of approval for commercial, industrial and institutional development applications.

2.3 REVIEW OF THE HEALTH SERVICES REGULATIONS

The Health Services Regulations were reviewed to identify their strengths and weaknesses and to make recommendations as to how they could be strengthened. Regulations reviewed in 2014 were:

- Health Services (Disposal of Offensive Matter) Regulations, 1969
- Health Services (Swimming Pools) Regulations, 1970
- Health Services (Food Hygiene) Regulations, 1969
- Health Services (Restaurants) Regulations, 1969
- Health Services (Lodging Houses and Barracks) Regulations, 1970
- Health Services (Building) Regulations, 1969

Regulations which were not reviewed during 2014 were the (Private Hospital and Nursing Homes) Regulations 1969 and the (Senior Citizens Homes and Maternity Homes) Regulations 2005.

2.4 LOOKING FORWARD

The process of completing the review of the Health Services Act and Regulations will continue in 2015 with the preparation of the review report. Routine activities such as the processing of building applications, evaluating primary wastewater treatment systems,

investigating building complaints and inspecting and evaluating commercial and industrial buildings will continue in 2015.

3 DERELICT BUILDINGS AND VEHICLES

The Derelict Buildings and Vehicles Section undertakes the identification and coordinates the removal of derelict buildings and vehicles in Barbados. The Section also regulates the removal and disposal of asbestos (Section 7.4). The Derelict Buildings and Vehicles Section consisted of a Senior Environmental Inspector and two Environmental Inspectors.

3.1 DERELICT BUILDINGS

In 2014, there were changes made to the procedure for the identification and removal of derelict buildings. These changes were as a result of the court case Peoples Incorporated vs. the Attorney General. The changes include the following:

- More detailed information included on the notices
- Photographic evidence of the derelict building
- Notices sent to owners of the derelict building by registered mail.

Another change was that contracts were also issued based upon pre-assigned groups rather than individual structures as was previously done.

3.1.1 IDENTIFICATION AND REMOVAL OF DERELICT BUILDINGS

During 2014, one hundred and seven (107) buildings were identified as being derelict buildings. A building is considered derelict if it meets the following criteria:

- abandoned
- dilapidated
- unoccupied
- structurally compromised
- the presence of rodents and vermin
- used for illegal activities, or
- causes discomfort to the public

Of the buildings identified forty–five (45) were removed and three sites were cleared for $ 183,007.51.

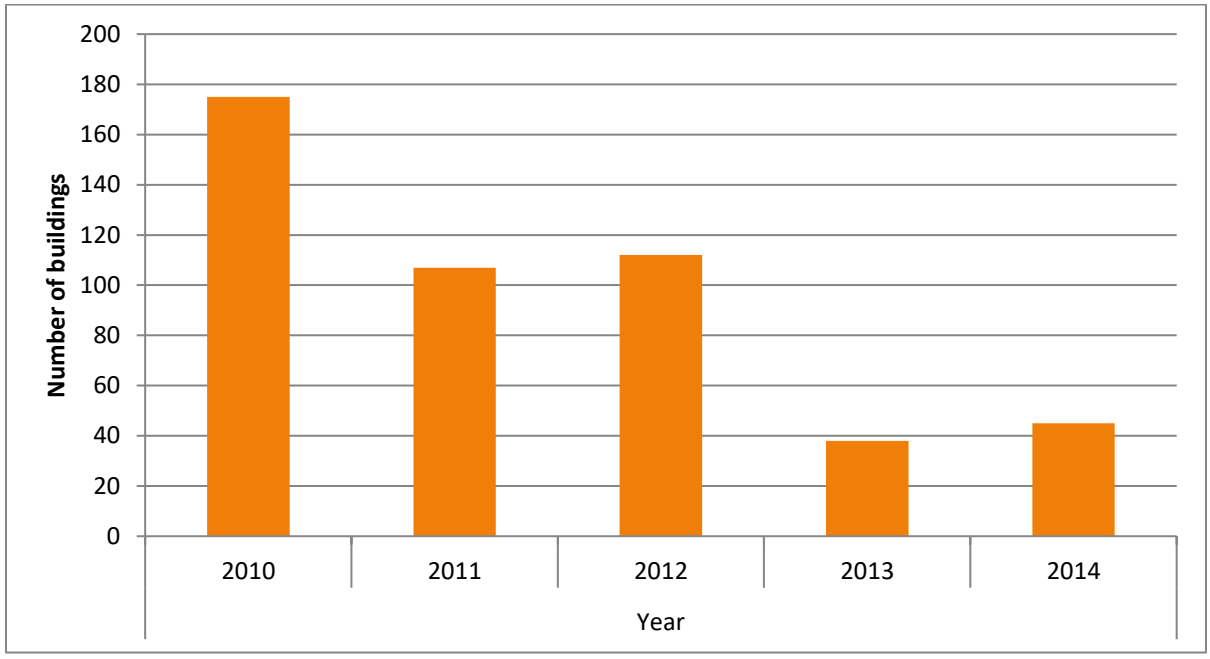

FIGURE 5: NUMBER OF BUILDINGS REMOVED FROM 2010-2014

Figure 5 above shows that there has been a general decrease in the number of buildings removed as part of the derelict building's programme.

3.1.2 COST RECOVERY

At the end of 2014, the Department collected seventeen hundred ($1,700) dollars as part of the cost recovery programme. The cost recovery aspect of the Derelict Buildings removal programme is the process of recovering costs from owners of buildings that have been demolished utilizing government funds. The demolition of a building occurs if an owner does not comply with the notice to either refurbish/repair the building or request a stay of execution to execute clean-up activities.

3.2 DERELICT VEHICLES

This aspect of the derelict buildings and vehicles programme involves the identification and removal of derelict vehicles. In the first half of 2014, eight-five (85) vehicles were identified and classified as being derelict. However, after the closure of the Bagatelle Bulky Waste Facility which was the authorized location for the disposal of derelict

vehicles the Derelict Vehicles Programme was suspended. This situation has created a serious challenge for the Department with respect to the proper disposal of metal waste.

3.3 LOOKING FORWARD

The Derelict Buildings programme will continue in the upcoming year with a total of eighty houses being targeted for removal. Additionally, greater emphasis will be placed on the recovery of costs from property owners of structures demolished and removed by the Department.

4 ENVIRONMENTAL IMPACT ASSESSMENTS

Environmental Impact Assessments (EIAs) and other development-related documents are in most cases reviewed by the Environmental Planning, Education and Research (Technical Officer) Section. The EPD is a member of the EIA Review panel and comments made are forwarded to the Chief Town Planner (Town and Country Development Planning Office (TCDPO)) upon completion.

The Environmental Technical Officer Section consists of a Senior Environmental Technical Officer, one Environmental Technical Officer and one Technical Officer.

4.1 ENVIRONMENTAL IMPACT ASSESSMENTS AND RELATED DOCUMENTS

In 2014, the EPD received twenty (20) documents related to development applications. Table 5 below shows the distribution of the different types of documents reviewed.

TABLE 5: NUMBER OF DOCUMENTS BY TYPE RECEIVED DURING 2014

Types of Documents	Number
Environmental Impact Assessment	7
EIA Addendum	5
EIA Revised	1
TOR	1
TOR Revised	2
Environmental Management Plan	2
Environmental Scoping Study	1
Social Impact Assessment Addendum	1
TOTAL	**20**

During this period, the department submitted comments or recommendations to the TCDPO related to twenty-five (25) development-related documents. There were two documents received in 2014 which were outstanding at the end of the year.

4.2 LOOKING FORWARD

In 2015, the ETO Section will embark on the finalization of the EIA guidelines document and commence preparation of the environmental guidelines for siting, construction and disposal of renewable energy systems

5 MARINE POLLUTION CONTROL

The Marine Pollution Control Section (MPCS) is responsible for implementing the Marine Pollution Control Act CAP 392A. The MPCS carries out activities to determine the level of pollution from various sources including land-based sources and dumping activities through regulatory inspections, investigation of complaints, developing and implementing programmes for marine litter and the updating the National Oil Spill Contingency Plan.

The Section is staffed by the Senior Marine Pollution Officer and two Marine Pollution Officers. There was also a vacant Marine Pollution Inspector/Marine Pollution Officer Post.

5.1 REGULATORY INSPECTIONS

Regulatory inspections of operations which may release pollutants into the environment involve the following activities:

a) Desktop research
b) Development of a questionnaire
c) Site visit to the operation which includes:
    a. Administering the questionnaire
    b. Recording of observations
    c. The sampling of releases to the environment and/or environmental media
d) Preparation of the report
e) Dissemination of findings to the company

A compliance inspection is carried out to ensure that the establishment has carried out the recommended actions which were highlighted during the initial regulatory inspection. The activities for the compliance inspections are similar to those indicated above for the regulatory inspection.

One regulatory inspection was conducted during 2014 at Chickmont Foods Limited. The report was redrafted after it was lost during a crash of the computer server and it was subsequently reviewed internally before finalization.

The process of conducting additional inspections was suspended in 2014 to allow for an evaluation of the programme to ensure that it is meeting its objectives. However, due to the server crash, the focus was given to the recovery and rewriting of lost reports.

The following eleven (11) reports were lost due to the failure of the computer server:

1. Compliance Reports:
    a. Barbados Light and Power (Garrison, Seawell, Spring Garden, Haggatt Hall Storage and substations)
    b. West Indies Rum Distillery and
    c. Rum Refinery of Mount Gay
2. Printers guidelines
3. Regulatory Inspections:
    a. Hipac Limited,
    b. Berger Paints,
    c. Barbados Bottling Company,
    d. B & B Distribution,
    e. Harris Paints,
    f. Pine Hill Dairy and
    g. Trowel Plastics Barbados Ltd.

Five of the reports that were lost were rewritten.

5.2 COMPLAINTS

The MPCS investigates complaints where the activities involved have the potential to negatively impact the marine environment. These can be from either point (e.g. releases from a pipe) or non-point diffused sources (e.g. contaminated stormwater) of pollution. Examples of complaints investigated include oil spills, sewage discharges and fish kills.

5.2.1 TOTAL AND TYPES OF COMPLAINTS

The MPCS received eleven (11) complaints during 2014. Ten (10) were investigated and one (1) regarding littering was referred to the Royal Barbados Police Force for investigation.

Table 6 below shows the types of complaints received with a slight majority of complaints falling in the category defined as "other".

TABLE 6: TYPES AND TOTAL NUMBER OF COMPLAINTS RECEIVED AND INVESTIGATED

Type	Received	Investigated
Oil Pollution	3	3
Wastewater	3	3
Other	5	4
Total	**11**	**10**

The "other" category includes complaints regarding discolouration of water in an estuary, the overflowing of a well, a blocked stormwater drain, marine litter and a pipeline running from land to the ocean. The wastewater discharge complaints were from hotels and a restaurant. Oil pollution complaints were caused by illegal dumping, sinking of vessels, vandalism and mechanic shop operations.

5.3 NATIONAL MARINE LITTER PROGRAMME

The National Marine Litter Programme involves the collection of data on the types and quantities of marine litter in Barbados. The MPCS monitors Morgan Lewis Beach in St. Andrew on the day designated as International Coastal Clean-up Day yearly.

September 20, 2014, was International Coastal Clean-up (ICC) Day and the EPD held its annual collection at the Morgan Lewis Beach, St. Andrew. Five thousand seven hundred and thirty-one (5, 731) items of litter weighing four hundred and sixty-one (461) pounds were collected. The majority (44 %) of the items fell into the category of "Most Likely to be Found" which consists of recreational items such as beverage bottles, bottle caps, cups and plates.

One hundred and sixteen (116) persons participated in the clean-up of Morgan Lewis Beach.

5.4 NATIONAL OIL SPILL CONTINGENCY PLAN AND THE NATIONAL OIL SPILL RESPONSE COMMITTEE

The Environmental Protection Department is the chair of the National Oil Spill Response Committee (NOSRC) and the NOSRC is responsible for providing recommendations for strategic policy direction concerning the National Oil Spill Contingency Plan (NOSCP). The EPD has responsibility for the upkeep and maintenance of the NOSCP, keeping an updated equipment list of response equipment and coordinating committee meetings.

In 2014, activities included the development of the work plan for the NOSRC and updating the inventory of oil response equipment and contact information. Additionally, subcommittees were established with responsibilities for different aspects of the work programme.

The Oistins Bay and Shoreline Oil Spill Response Action Plan was reviewed and comments were forwarded to Barbados National Oil Company.

5.5 STORM WATER QUALITY ASSESSMENT PROJECT

The Storm Water Quality Assessment Project seeks to characterize the stormwater discharges to the marine environment and quantify the levels of selected pesticides and pharmaceuticals in coastal, ground and marine water, sediment and benthic organisms.

A committee was established to assist the Project Manager for the Water Resources Management and Flood Resilience Climate Change Adaptation Program. The Storm Water Quality Project was merged into this programme which is being funded by the United States Agency for International Development (USAID). The work plan, Terms of Reference and Request for proposals were completed during this period. Also, EPD participated in the technical review of the bids that were submitted. It is anticipated that consultants will be selected in 2015.

5.6 CHALLENGES

There were some human resources challenges throughout the year especially in the early part when there was reduced staff compliment.

5.7 LOOKING FORWARD

The Marine Pollution Control Programme in 2015 will continue its routine activities such as investigating complaints, completing reports under the regulatory inspection and compliance assessment sub-programme and marine litter and oil spill response activities. The Section will also embark on a review of the regulatory inspections and compliance assessments sub-programme to make improvements to the process.

6 MULTILATERAL ENVIRONMENTAL AGREEMENTS

The coordination of the activities aimed at implementing the multilateral environmental agreement is executed by the Environmental Technical Officers Section, Marine Pollution Control Section and the Solid Waste and Hazardous Materials Section.

A multilateral environmental agreement (MEA) is a legally binding agreement between three or more states relating to environmental issues. The EPD is responsible for the following:

- Cartagena Convention specifically its Oil Spill and Land-Based Sources of Marine Pollution Protocols, Basel Convention on the Transboundary Movement of Hazardous Wastes and their Disposal,
- The Stockholm Convention on Persistent Organic Pollutants (POPs) and

Convention on the Prohibition of the Development, Production, Stockpiling and Use of Chemical Weapons/Chemicals Weapons Convention (CWC)

6.1 CONVENTION FOR THE PROTECTION AND DEVELOPMENT OF THE MARINE ENVIRONMENT OF THE WIDER CARIBBEAN REGION (CARTAGENA CONVENTION)

The MPCS prepared comments on the revised draft Cabinet Paper on the Ratification of the Protocol concerning Land-Based sources and Activities which were submitted to the Ministry of Environment and Drainage for further action.

A copy of the Caribbean Regional Coordinating Unit (CAR/RCU) Marine Litter National Survey Report was requested by the Caribbean Youth Environment Network (CYEN). A copy of the report was submitted to the relevant parties.

6.2 BASEL CONVENTION ON THE TRANSBOUNDARY MOVEMENT OF HAZARDOUS WASTES AND THEIR DISPOSAL

The 2012 Annual Basel Report was approved and submitted to the Technical Secretariat of the Basel Convention. The 2013 Annual Basel Report was completed and submitted to the Ministry of Environment for review and approval. Additionally, despite the proposed shipment of used oil by World Exchange not coming to fruition, the required documentation was processed by the Department.

The SWHMS commenced drafting of a technical brief to support the establishment of a bilateral agreement between Barbados and the USA to facilitate the shipment of waste to the USA for environmentally sound disposal. This document was forwarded to the Ministry of Environment for further action.

6.3 STOCKHOLM CONVENTION ON PERSISTENT ORGANIC POLLUTANTS

The Department is responsible for the implementation of the Stockholm Convention in Barbados. The National Implementation Plan for the Convention outlined various activities required for implementing the Convention in Barbados. One of these activities was placing polychlorinated biphenyls (PCBs) on a licence, the formulation and implementation of a routine equipment inspection programme for stockpiles and waste and the notification in writing for the export of PCB-containing materials for environmentally sound disposal.

6.3.1 PLACING MIXTURES AND PREPARATION CONTAINING PCBS ON THE IMPORT AND EXPORT LICENSING SYSTEM

The Department assisted the Department of Commerce with the drafting of a Cabinet Paper for Placing Mixtures and Preparation containing Polychlorinated Biphenyls (PCBs) on the Import and Export Licensing System. This aforementioned Cabinet Paper was approved by Cabinet on August 21, 2014, as a result, regulations were drafted to place PCBs on the import and export licensing.

The EPD also provided the Department of Commerce with comments on the Draft of the Miscellaneous Controls (Importation and Exportation of Goods) (Prohibition) (Polychlorinated Biphenyls) Regulations 2014.

6.3.2 *NOTIFICATION PROCEDURE FOR THE IMPORT AND EXPORT OF PCB CONTAINING EQUIPMENT WITH THE CUSTOMS AND EXCISE DEPARTMENT*

The absence of suitable tariff headings under the Customs Tariff (Amendment) Order, 2009 prevented the placing of equipment containing PCBs on import and export licensing. To address this issue a notification procedure was proposed.

To function effectively, the first version of the procedure required information that was not recorded in the ASYCUDA (Automated System for Customs Data) system utilized by the Customs and Excise Department (CED). Consequently, the procedure was revised in 2014 and forwarded to the CED for comment.

Under the revised procedure the CED would notify the EPD when certain categories of equipment were being imported or exported and furnish the EPD with relevant information about the shipment. The EPD would research the equipment to determine whether it is likely to contain PCBs. If the equipment is likely to contain PCBs, the EPD will liaise with the importer or exporter to ensure the equipment is managed in an environmentally sound manner.

6.3.3 *GLOBAL ATMOSPHERIC PASSIVE SAMPLING*

During 2014, the activities for this monitoring programme included the replacement of samplers and shipment to Environment Canada for analysis. This monitoring programme seeks to determine the presence and concentration of persistent organic pollutants and other toxic substances in the air using passive monitors.

6.3.4 *DEVELOPMENT AND IMPLEMENTATION OF A SUSTAINABLE MECHANISM FOR PERSISTENT ORGANIC POLLUTANTS*

The Development and Implementation of a Sustainable Mechanism for Persistent Organic Pollutants in the Caribbean is a Global Environment Facility (GEF) funded project with United National Industrial Development Organization (UNIDO) as the implementing agency and Basel Convention Regional Center for Training and Technology Transfer for the Caribbean (BCRC-Caribbean) as the project executing agency. The project will be implemented over five years. The project has five components and Barbados has agreed in principle to participate in the following three components:

- Creating the enabling mechanisms in the Caribbean for effective implementation of the Stockholm Convention
- Reduce unintentionally produced POPs by improving poor waste management practices at landfills

- Assess potentially contaminated site to determine the level of remediation required.

The project preparation proposal phase of the project for submission to the GEF for CEO Approval was from March to December 2014. A meeting was hosted at the Ministry of Environment on June 18, 2014, with BCRC–Caribbean representatives, the EPD and stakeholders to inform attendees of the project and to review the project details such as budget and Objectively Verifiable Indicators (OVI) among others. Another meeting was held on July 11, 2014, concerning co-financing arrangements with non-governmental organizations. Stakeholders were asked to indicate programmes and/or projects which may be considered for co-financing of the project and the estimated in-kind contribution they could commit to the project.

A representative of the department attended the regional validation workshop for the project on September 25th to 26th 2015. The purpose of the workshop was to finalise all the technical, administrative and financial elements of the project.

6.4 CONVENTION ON THE PROHIBITION OF THE DEVELOPMENT, PRODUCTION, STOCKPILING AND USE OF CHEMICAL WEAPONS/CHEMICALS WEAPONS CONVENTION (CWC)

The annual report for the CWC was completed and forwarded to the MED for submission through the Ministry of Foreign Affairs and Foreign Trade. In the later part of 2014 requests were made for the completion of the annual report for the year 2015.

The Department as the focal point for the Convention has facilitated training for representatives from several different agencies associated with chemicals management. These include the Barbados Fire Service, Queen Elizabeth Hospital emergency services and the Royal Barbados Police and the Barbados Defence Force.

6.5 IMPLEMENTATION OF ACTIVITIES RELATED TO THE GLOBALLY HARMONIZED SYSTEM OF CLASSIFICATION AND LABELLING OF CHEMICALS (GHS)

In 2014, the development of a public awareness campaign for the Globally Harmonized System of Classification and Labelling of Chemicals (GHS) project commenced with the preparation of the Invitation for Bid. The list of prospective consultants was also identified.

Planning for joint workshops with the Labour Department and Pesticide Control Board commenced during 2014 with the meetings being held with the respective parties. The

purpose of the workshops was to raise awareness of the role and benefits that GHS can provide to occupational health and safety and the agricultural sector respectively.

6.6 CARIBBEAN REGIONAL FUND FOR WASTEWATER MANAGEMENT

The Caribbean Regional Fund for Wastewater Management (CReW) is funded by the Global Environment Facility (GEF) and implemented by the Inter-American Development Bank (IADB) and the United Nations Environment Programme (UNEP). One of the aims of the project is "to facilitate policy and legal reforms, regional dialogue and knowledge exchange with key stakeholders in the wider Caribbean region" (GEF, 2013). It consists of five project components of which Barbados is participating in Component II – Reforms for Wastewater Management.

A series of small-scale funding agreements (SSFAs) are being used to execute the national capacity-building activities under the CReW Component II. These SSFAs were negotiated between the UNEP Secretariat of the Cartagena Convention (CAR/RU) and the respective governments.

The National Component of the project consisted of two phases which were aimed at achieving the following objectives:

- Development of a National Communications Strategy for Wastewater Management
- Development of a licensing and permitting system for Wastewater Operators and Regulators and the Preparation of a Guidance Document for the Drafting of Wastewater Regulations

The Environment Protection Department undertook a bidding process which involved the drafting of invitations to bid and advertising of the activities under Phase 1 and 2 of the project. The receipt of an inadequate number of bids by the initial deadline resulted in an extension of the deadline for submission of bids. The costs as indicated by the submitted bids were significantly higher than the budgetary allocation and it was determined by the EPD and the Barbados Water Authority that only Phase 2 of the project could be completed. As such a new SSFA was signed by the Barbados Water Authority outlining the new project requirements. As a result of the new bidding process, Environmental Advisors Inc (EAI) was selected to carry out proposed project works. Endorsement of the project contract with the consultants was done in December 2014 to facilitate the commencement of project works.

6.7 LOOKING FORWARD

The Department in 2015 with regards to the Stockholm Convention will undertake an assessment and evaluation of the practices of a local incinerator.

In the SAICM Sub-programme, there will be an assessment of existing laboratory capacities to conduct chemical analysis, development of a mechanism for tracking chemicals through their entire life cycle, and development of a broad-based consumer-focused public awareness campaign on GHS.

Regarding the activities under Cartagena Convention, a proposal will be developed to obtain funding from the Convention for the development of the Register of Pollutants.

The CReW Project will continue in 2015 with the coordination of a workshop for wastewater regulators and the facilitation of a national workshop. Additionally, it is expected that the drafting of the legislative guidance document for wastewater regulations and the development of a licensing and permitting system for wastewater treatment system will be undertaken.

7 SOLID AND HAZARDOUS MATERIALS SECTION

In relation to solid waste, the Solid Waste and Hazardous Materials Section (SWHMS), of the EPD, is responsible for the following:

- monitoring and regulating the waste disposal sites operated by Sanitation Service Authority and
- contributing to the development of solid waste management policies for Barbados.

With respect to hazardous materials management, the Section regulates the disposal of hazardous materials and develops policy recommendations for hazardous materials management.

Presently the section consists solely of the Senior Environmental Protection Officer as the Environmental Protection Officer post is vacant. The section is therefore severely challenged due to a lack of human resources to complete the required activities.

7.1 MONITORING OF DISPOSAL SITES

There are four waste disposal sites operated by the Sanitation Service Authority which are as follows:

- Mangrove Pond Landfill, St. Thomas (Sanitary Landfill) – Municipal Solid Waste
- Asbestos Disposal Site, Rock Hall, St. Philip
- Blood and Grease Disposal Site
- Edgecumbe Satellite Site – for disposal of construction and demolition waste and tree trimmings

The SWHMS is tasked with monitoring the activities of these sites by conducting monthly inspections using the Landfill Inspection Form. Any issues which are highlighted during the inspections are communicated to the Sanitation Service Authority. Eleven (11) inspections were undertaken during 2014 with no inspections taking place in August due to a lack of personnel.

7.2 Solid Waste Complaints and Investigations

During 2014, six complaints were received and investigated. Four of the complaints were classified as miscellaneous. Of which, one was a vehicle maintenance facility, two were for disposal activity at Armag Quarry and another was illegal excavation at the Rock Hall St. Philip. The other two complaints were regarding illegal dumping.

7.3 Advice on the Disposal of Hazardous Wastes

Forty-five (45) requests for disposal advice of hazardous and special wastes were received by the Department during 2014. The majority of the requests were addressed; only one was pending at the end of the year.

7.4 Import of Radioactive Materials

The Department reviewed applications for permission to import radioactive materials into Barbados. There were thirty-two (32) applications which were processed during 2014. The applicants included the Queen Elizabeth Hospital, Nuclear Medicine Barbados and Barbados National Oil Company Limited (BNOCL) (Table 7).

TABLE 7: RADIOACTIVE MATERIALS IMPORTED IN 2014

Importer	Radioactive Substance	Activity/ *GBq	No. of Shipments	Quantity of each shipment	Units
Queen Elizabeth Hospital	Sodium Iodide (Iodine-131) Solution	9.25	13	10	ml
Nuclear Medicine	Technetium Generator (Molybdenum -99)	30	18	+	-
Barbados National Oilfield Services Ltd	Nuclear Densitometer (Caesium-137)	7.5	1	+	-

+ The actual quantity of the substance was not given.
*GBq – gigabecquerel

7.5 Review Of Pesticide Applications

The Environmental Protection Department reviews applications submitted to the Pesticide Control Board (PCB) for the importation of pesticides into Barbados and makes recommendations for approval or refusal of import. Thirty-five (35) applications were reviewed and recommended for approval. These recommendations were forwarded to the Chairperson of the Pesticide Control Board for further action.

A need was identified for the improved efficiency of the review of applications and as such the preparation of a standard operating procedure for the review of applications commenced.

7.6 Environmentally Sound Disposal of Asbestos

This particular activity is carried out by the Derelict Section of the EPD. The Section processes requests for permission to remove asbestos-containing materials and fibreglass. The DS also supervises the removal of asbestos-containing materials across the island. The purpose of this activity is to ensure that as a hazardous material asbestos is handled and disposed of in an environmentally sound manner.

In 2014, sixty-three (63) requests for permission to remove asbestos-containing materials were processed, approved and monitored.

7.7 Emergency Response

On April 28, 2014, the Department responded to a fire at the Mangrove Landfill in the area where the tyres are stockpiled. The Environmental Protection Department is one of the agencies that participate in national emergency management procedures. Other agencies present were the Royal Barbados Police Force, Environmental Health Department, Barbados Fire Service and Department of Emergency Management.

7.8 Looking Forward

Inspections of disposal sites, recycling preparation entities and Sustainable Barbados Recycling Center Inc. (SBRC) will continue in 2015. There will also be the development of guidelines for recyclers.

8 PUBLIC AWARENESS

The Environmental Protection Department carries out various activities geared at increasing the awareness of the public regarding the role and responsibilities of the Department and also of environmental issues affecting Barbados.

8.1 ENVIROFOCUS NEWSLETTER

The articles for the March 2014 issue of the Envirofocus Newsletter were prepared and forwarded to the Ministry of Environment and Drainage for approval. Although permission was received from the Ministry to print and distribute the newsletter, the files were lost due to a failure of the computer server. The newsletter was therefore not published.

The September 2014 issue of the Envirofocus Newsletter was prepared and sent to the Ministry for approval. By December 31st, 2014 the Department had not received a directive from the Ministry regarding printing and dissemination of the newsletter.

The EPD will publish the EnviroFocus as an annual newsletter in 2015 and it will be disseminated via email rather than being printed.

8.2 "ADOPT-A-SCHOOL" PROGRAMME

The Department met with the Principal of the Graydon Sealy School to determine the next steps in an attempt to ensure that the "Adopt-A-Programme" is beneficial to the students in terms of their academic activities. The meeting was conducted in December 2014 and several activities in which EPD could participate were highlighted.

8.3 INTERNSHIP PROGRAMME

The Barbados Community College Summer Internship programme was not undertaken in 2014. A request was made to the MED for approval for hosting the interns but there was no response.

The EPD hosted a student from the Samuel Jackman Prescod Polytechnic for the Industrial Attachment – Business from December 22, 2014, to January 9, 2015.

8.4 DEVELOPMENT OF THE BOOKLET ENTITLED "GUIDELINES FOR THE SUBMISSION OF BUILDING DEVELOPMENT APPLICATIONS TO THE ENVIRONMENTAL PROTECTION DEPARTMENT"

The first draft of the booklet has been completed and is under internal review. The purpose of the booklet is to provide guidelines to the public for the submission of building development applications to the Environmental Protection Department. It covers topics such as ventilation and waste management.

8.5 WEBSITE

During 2014, a security breach resulted in the EPD's website being taken offline. The hosting arrangement with Sunisle Communications Inc. was subsequently terminated. The EPD took measures to have the Data Processing Department (DPD) host the new version of the website on their servers. The website was placed online by the DPD to allow for testing of the site. Several issues were identified and the Department was working to address them.

8.6 OTHER ACTIVITIES

The Department also participated in a range of other awareness activities as outlined below:

- A career showcase hosted by the National Union of Public Workers on March 25, 2014.
- On March 28, 2014, a presentation was made regarding the Chemical Weapons Convention to the Barbados Fire Service Awareness Training.
- On April 25, 2014, a presentation was made on the topic "Chemical and Hazard Communication under the GHS" at the International Labour Organization (ILO) World Day for Safety and Health at Work Commemorative Event by REA Envirohealth.
- A presentation on the Organisation for the Prohibition of Chemicals Weapons and the Chemical Weapons Convention was made at the Barbados Fire Service Hazard Awareness Training on July 25, 2014.
- Two presentations on Environmental Impact Assessment were made to the Masters' Students enrolled in the Department of Management Studies, University of West Indies Cave Hill.

8.7 LOOKING FORWARD

Routine activities such as the publishing of the Envirofocus newsletter, the Adopt-a-School programme and the Internship Programme will be undertaken in the coming year. There will also be the procurement of public awareness materials, development of an informational video on Best Management Practices for Construction and the development of an evaluation procedure for the components of the public education programme.

9 WATER QUALITY

The Water Quality Section is responsible for the implementation of the routine monitoring programmes for groundwater and nearshore water quality. It also researches potential sources of water pollution.

The Water Quality Section is manned by a Senior Environmental Protection Officer, two Environmental Protection Officers and as of July 2014, an Environmental Inspector was assigned to the Section.

9.1 GROUNDWATER MONITORING

The groundwater monitoring programme involves the sampling of potable water sources which consist of twenty (20) wells and two (2) springs. The programme is implemented by the Environmental Protection Department and the Barbados Water Authority (BWA) and the sampling frequency is shown in Table 8 below.

As noted in the 2013 annual report the Desalination plant is not part of the monitoring programme.

TABLE 8: THE SAMPLING SCHEDULE FOR EACH CATCHMENT AND SPRINGS

Area	Frequency/monthly
Belle Catchment	1st Tuesday
Hampton Catchment	2nd Tuesday
West Coast Catchment	3rd Tuesday
Springs	4th Tuesday

The samples were analyzed for twenty (21) water quality parameters which are compared to the relevant WHO Guidelines for Drinking Water.

In 2014, two hundred and ninety-nine (299) samples were collected under the Groundwater Monitoring Programme. A total of eighty-four (84) samples were collected from the Belle catchment, ninety (90) from the Hampton catchment, eighty-nine (89) from the West Coast catchment and thirty-six (36) from springs. One hundred and seventeen samples were taken by the EPD and the remaining by the BWA. The BWA took one hundred and three (103) groundwater samples which were tested for Nitrate-N. There has been no sampling conducted at the Codrington pumping station, St. Michael for the past three years (2011-2014).

A summary [1] of findings of the parameters; chlorides, Nitrate-N, sulphates, total dissolved solids and faecal coliform are outlined in subsequent sections.

9.1.1 CHLORIDES

None of the potable supply sources exceeded the WHO Guidelines value of 250 mg/l in 2014. However, the value for Villa Marie was close to the guideline value. The value at this site could be attributed to incidences of saltwater intrusion. The West Coast supply wells have average chlorides concentrations values that are higher than the values seen for other supply sources (Figure 6). As with Villa Marie, these readings may be the result of saline intrusion into these wells.

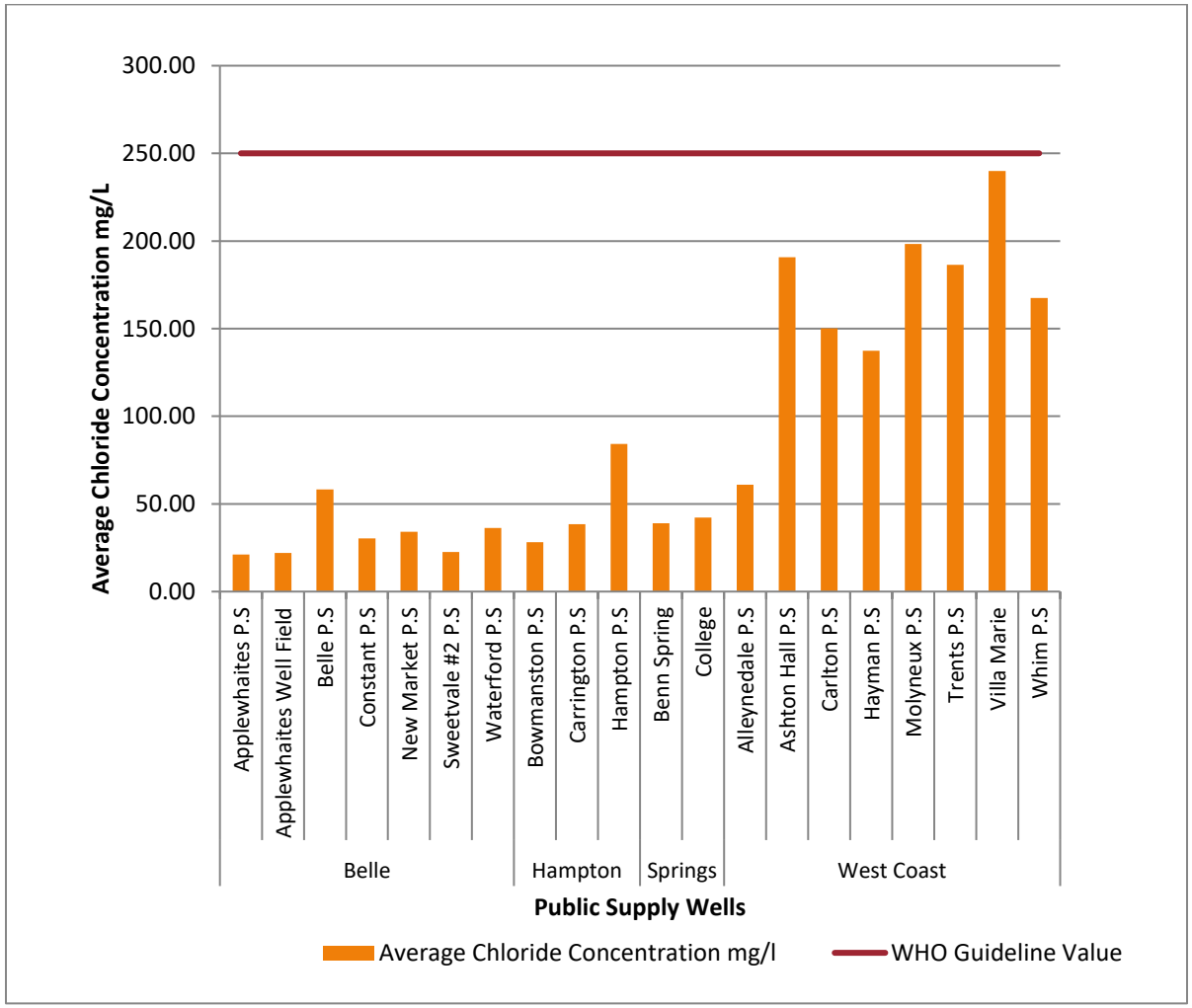

FIGURE 6: AVERAGE CHLORIDE CONCENTRATION FOR SUPPLY SOURCES FOR 2014

[1] Analysis is based on a total of 296 samples.

Over the last five years, Villa Marie and Trents have had the highest concentrations for chlorides which have approached or exceeded the standard (Figure 7).

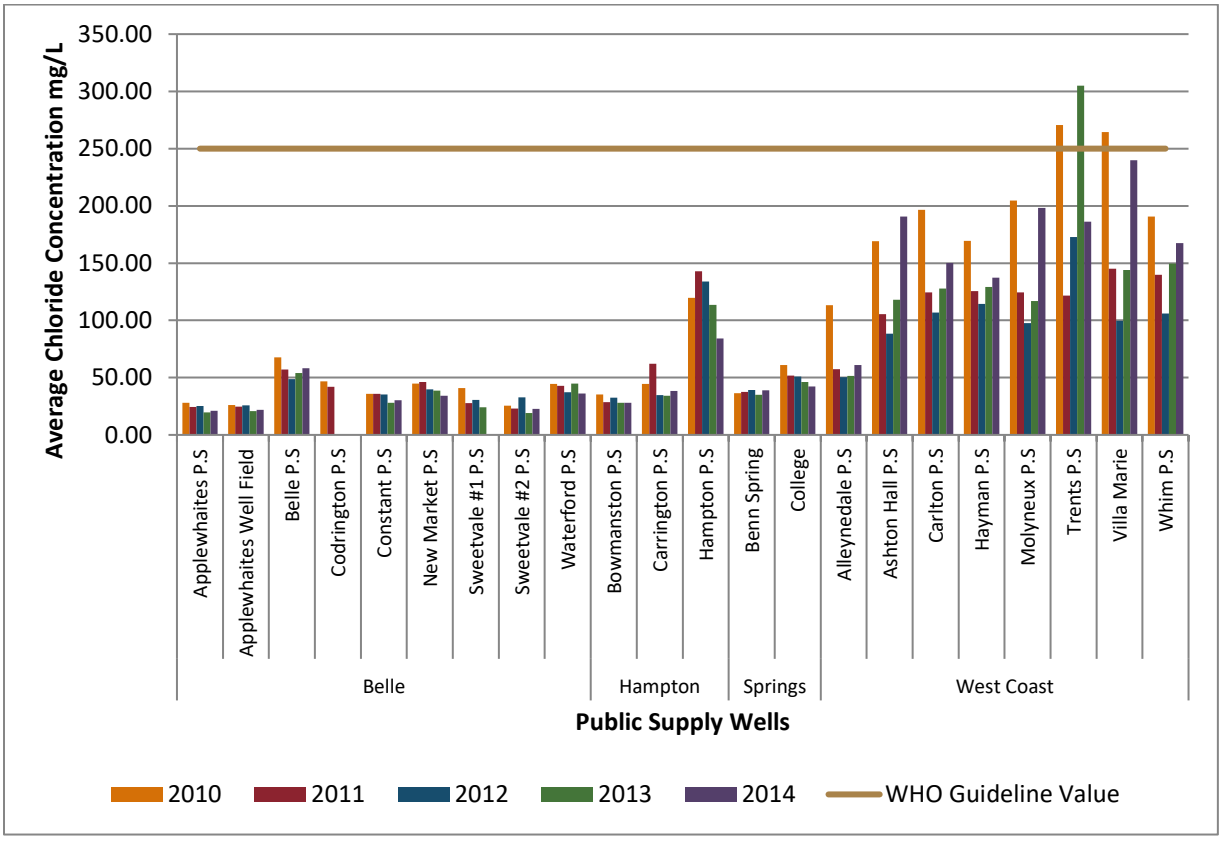

FIGURE 7: AVERAGE CHLORIDE CONCENTRATION FOR SUPPLY SOURCES OVER THE PERIOD 2010 – 2014

9.1.2 NITRATE EXPRESSED AS NITROGEN (NITRATE-N)

Figure 8 shows, that none of the potable water supply sources exceeded the WHO guideline value for Nitrate-N of 10 mg/l. The highest measured concentration of Nitrate-N was the Belle public supply well at 7.87 mg/l and the lowest at 4.63 mg/l were Sweetvale #2 and Molyneaux.

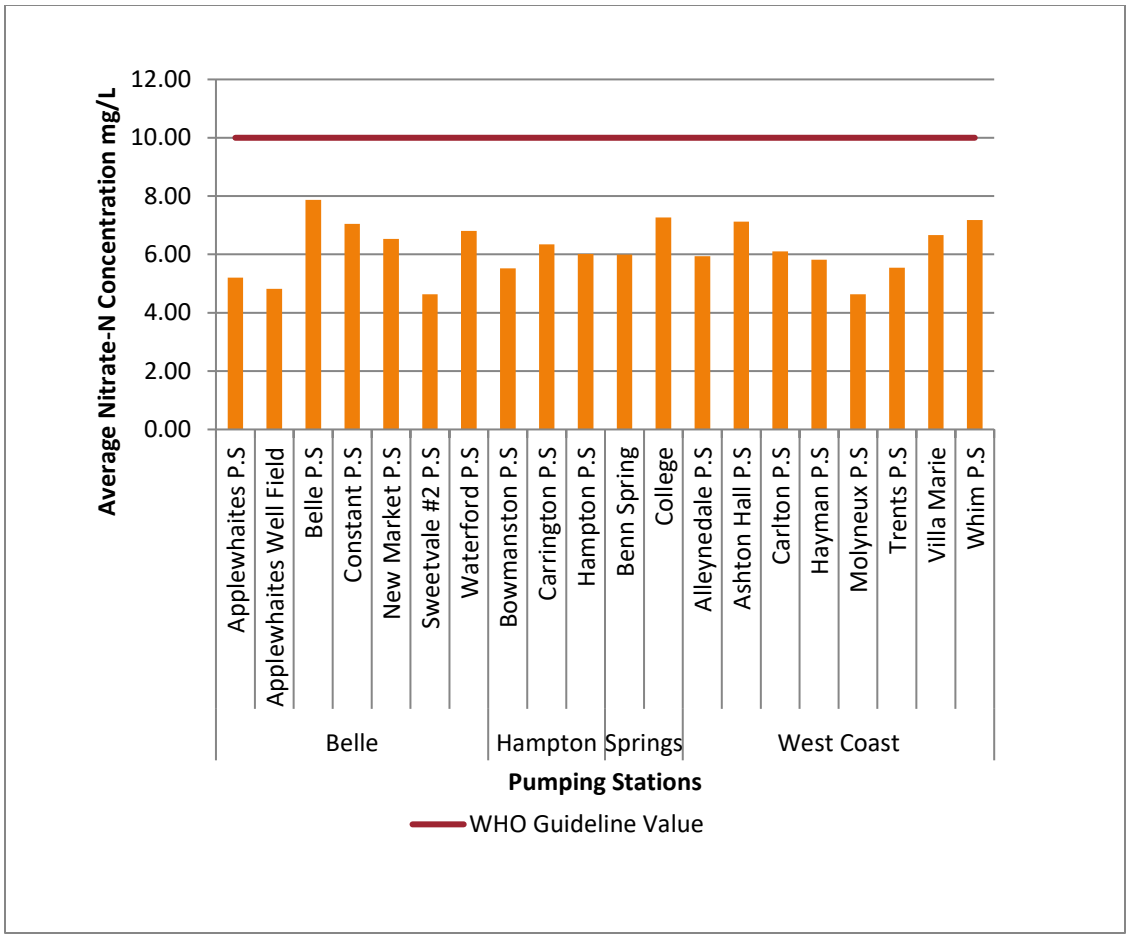

FIGURE 8: AVERAGE NITRATE-N CONCENTRATIONS FOR SUPPLY SOURCES FOR 2014

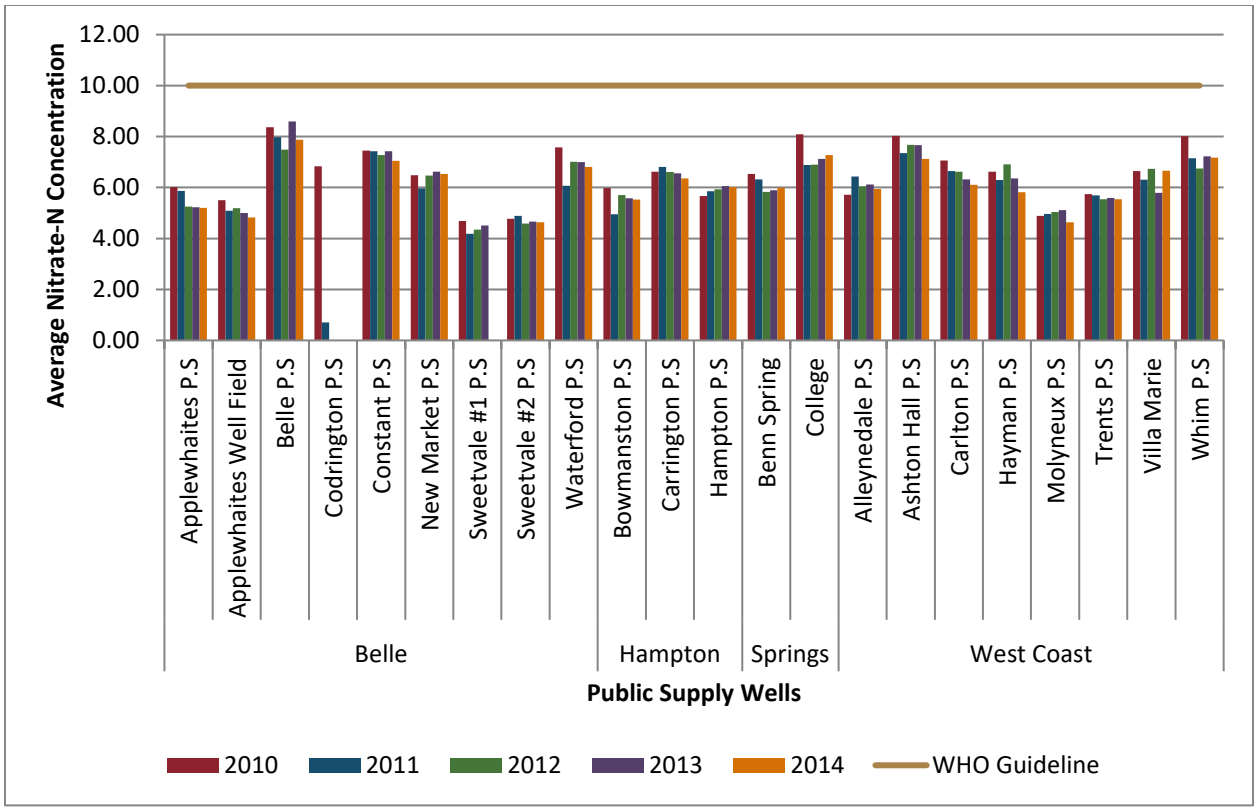

FIGURE 9: AVERAGE NITRATE-N CONCENTRATIONS FOR SUPPLY SOURCES OVER THE PERIOD 2010 TO 2014

For the five years 2010-2014, all wells were below the 10 mg/L limit (Figure 9).

9.1.3 SULPHATES

All of the public supply sources were below the 500 mg/l WHO guideline value for sulphates. Depending on the concentration, the presence of sulphates in water affects the taste. A laxative effect has been known to occur with sulphates concentration of 1,000-1,200 mg/L.

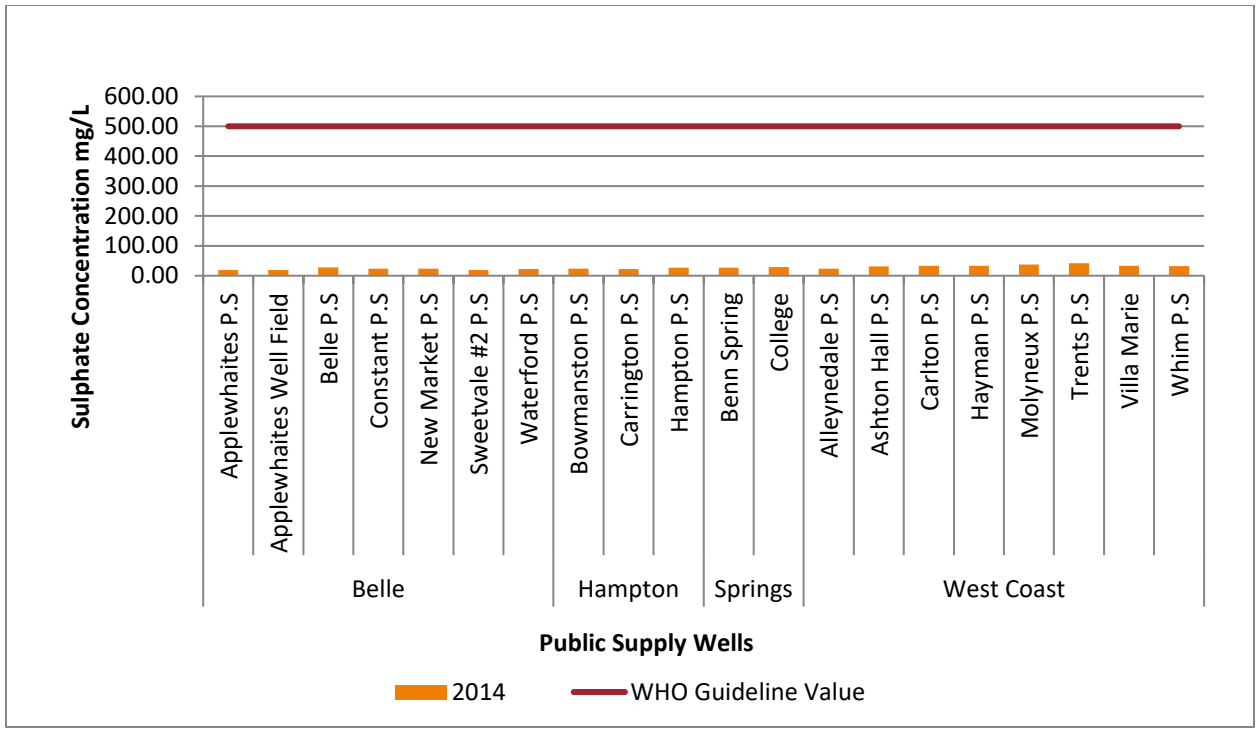

FIGURE 10: AVERAGE SULPHATE CONCENTRATIONS FOR SUPPLY SOURCES IN 2014

For the period 2010-2014, none of the wells exceeded the standard. All of the sites recorded results that were significantly lower than the relevant WHO guideline value of 500 mg/L (Figure 11). This shows that the concentration of sulphates does not currently result in any issues to the island's potable water supply.

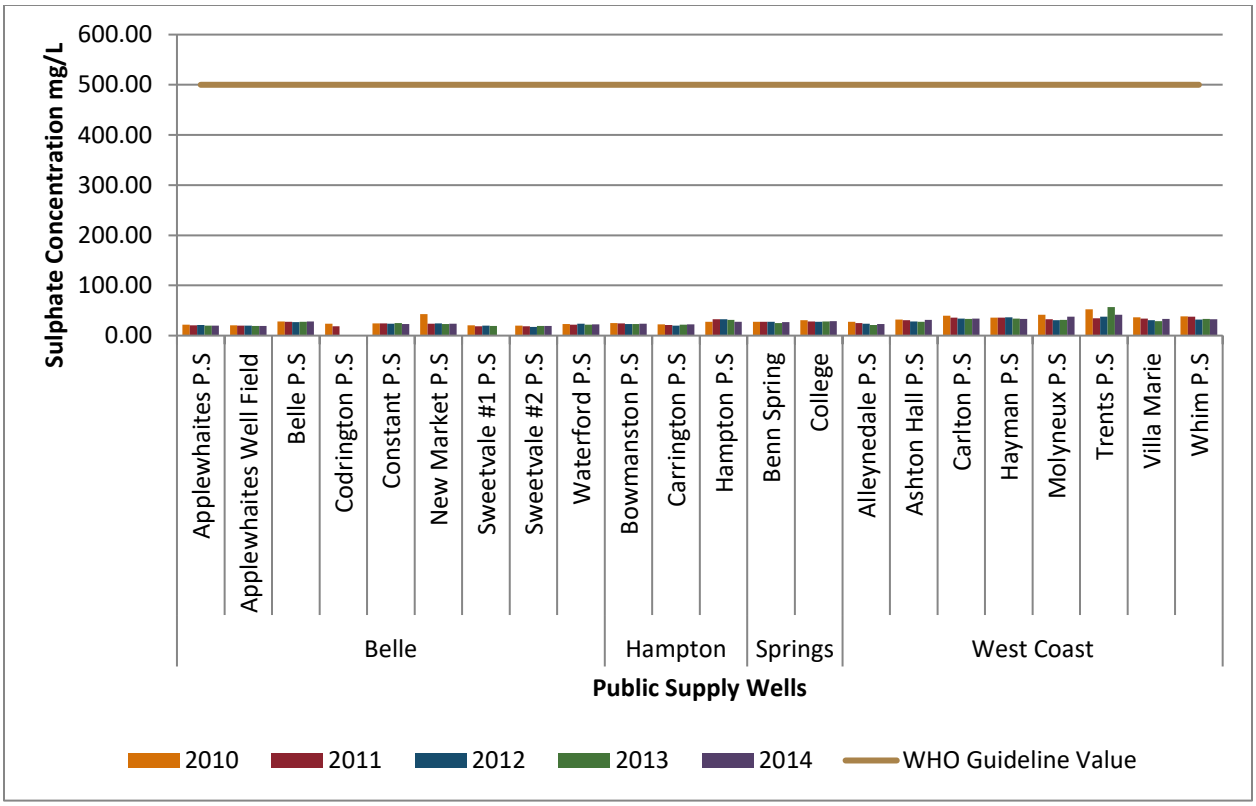

FIGURE 11: AVERAGE SULPHATE CONCENTRATIONS FOR SUPPLY SOURCES OVER THE PERIOD 2010-2014

9.1.4 TOTAL DISSOLVED SOLIDS

All of the public supply sources were below the upper threshold limit of 1,200 mg/L which is used to categorize the taste of the water (Figure 12). Four wells were in the poor threshold with respect to taste and these were Ashton Hall, Molyneaux, Trents and Villa Marie. For twelve wells, the taste was classified as good. Only four wells had Total Dissolved Solids (TDS) concentrations which placed them in the excellent category. These results are highlighted in Figure 12 below.

As with the chloride concentrations, the TDS values for the west coast pumping stations were on average higher than the other sources that are; Belle, Hampton and springs.

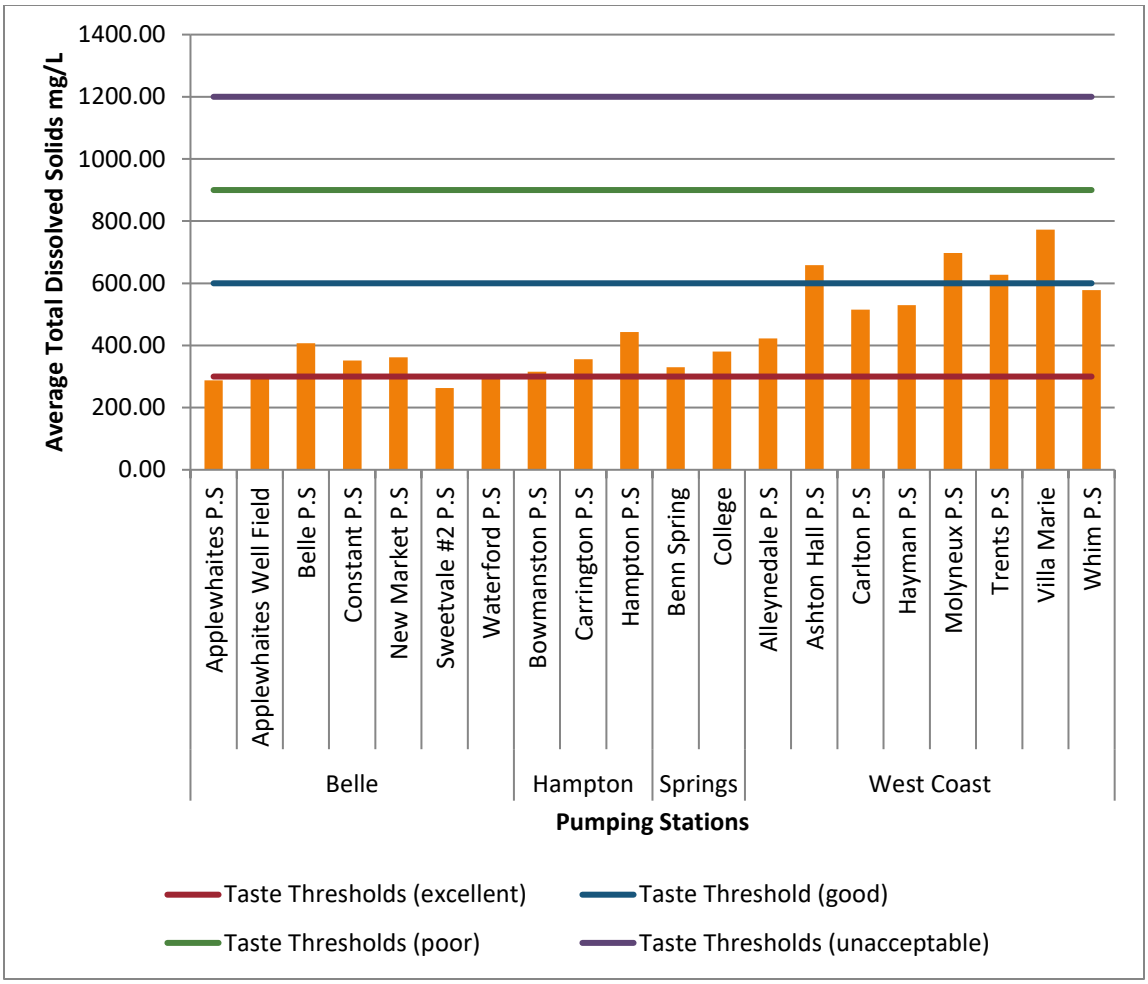

FIGURE 12: AVERAGE CONCENTRATION OF TDS FOR SUPPLY SOURCES FOR 2014

During the five years of 2010 to 2014, the TDS values have been consistent for most sources. However, Molyneaux, Trents, Ashton Hall, Whim and Villa Marie showed some fluctuations with Ashton Hall, Molyneaux, Trent's and Villa Marie entering the poor threshold (Figure 13).

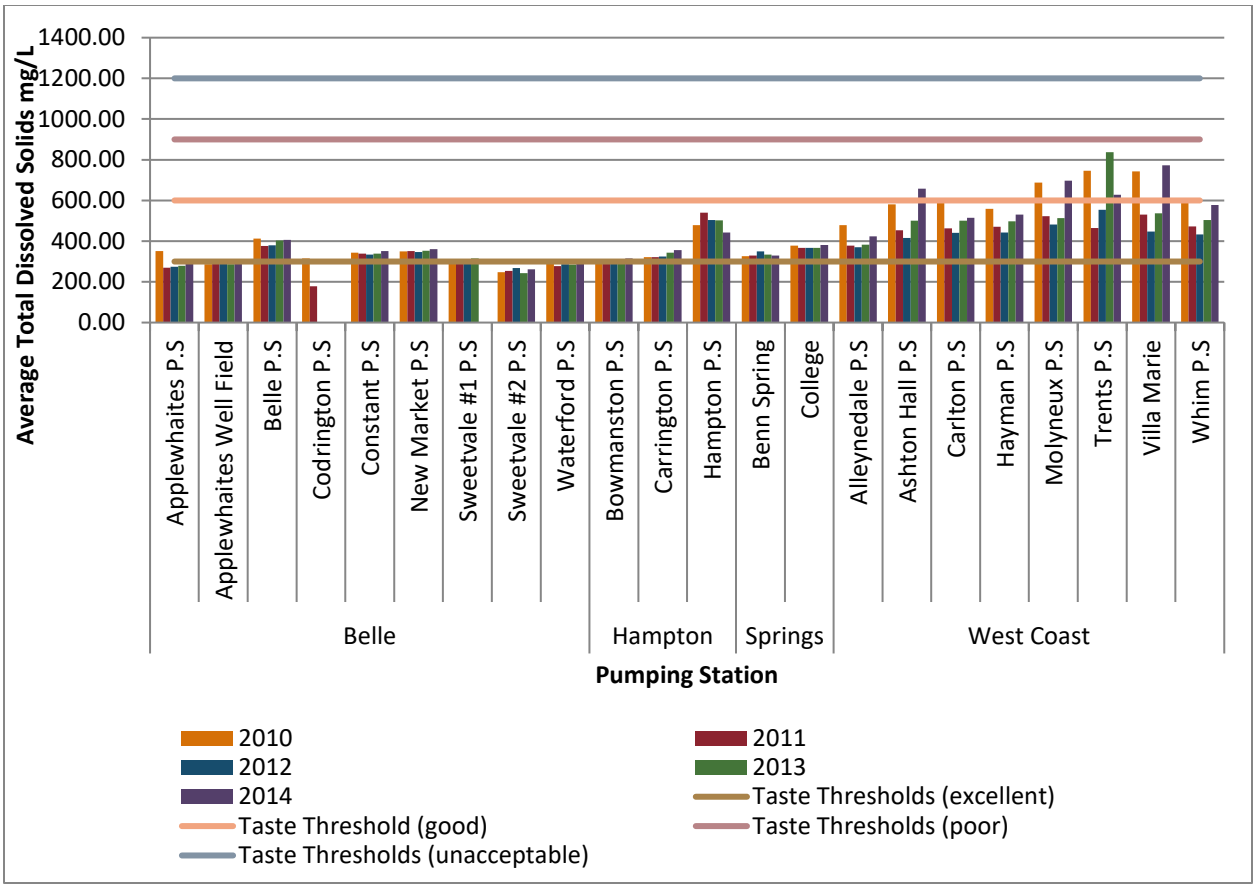

FIGURE 13: AVERAGE TDS CONCENTRATIONS FOR SUPPLY SOURCES OVER THE PERIOD 2010 – 2014

9.1.5 FAECAL COLIFORM

Most supply wells did not exceed the 0 Colony Forming Units (CFU)/ 100 ml guideline values. However the limits were exceeded at Villa Marie and College wells, the latter had the highest value at 55 CFU/100 ml.

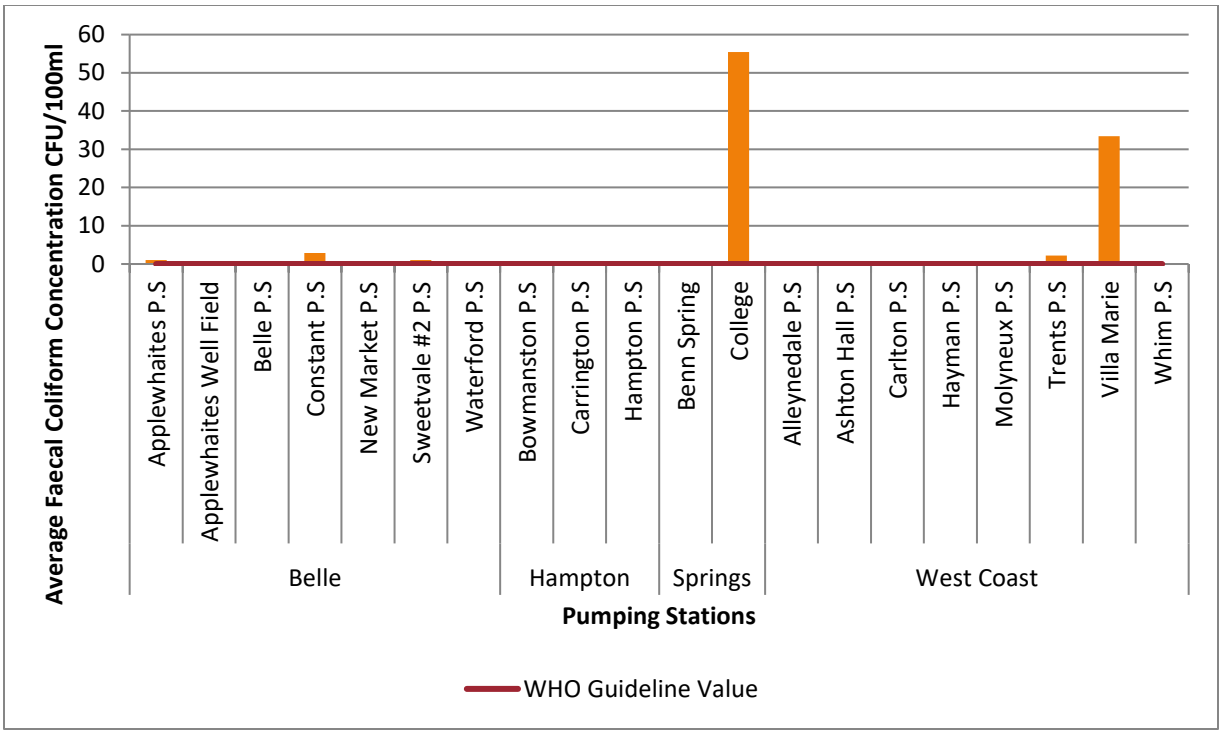

FIGURE 14: AVERAGE CONCENTRATIONS OF FAECAL COLIFORM FOR SUPPLY SOURCES IN 2014

The year 2014 is the second year in the five years that Villa Marie has exceeded the guideline value for Faecal Coliform. Before this, there was an exceedance in 2011. Figure 14 shows that the majority of wells have not exceeded the standard over the period under review.

Concerning the high faecal coliform counts recorded for the samples taken at Villa Marie, chlorination was no longer carried out at the site due to the theft of the chlorination equipment and this, therefore, resulted in high counts. Water from this site has been diverted to the Alleynedale pumping station for disinfection.

Additionally, high counts were also noted for the College pumping station as the site for sample collection is placed before the point of disinfection. Results are therefore not representative of the bacterial loading of the water within the distribution system.

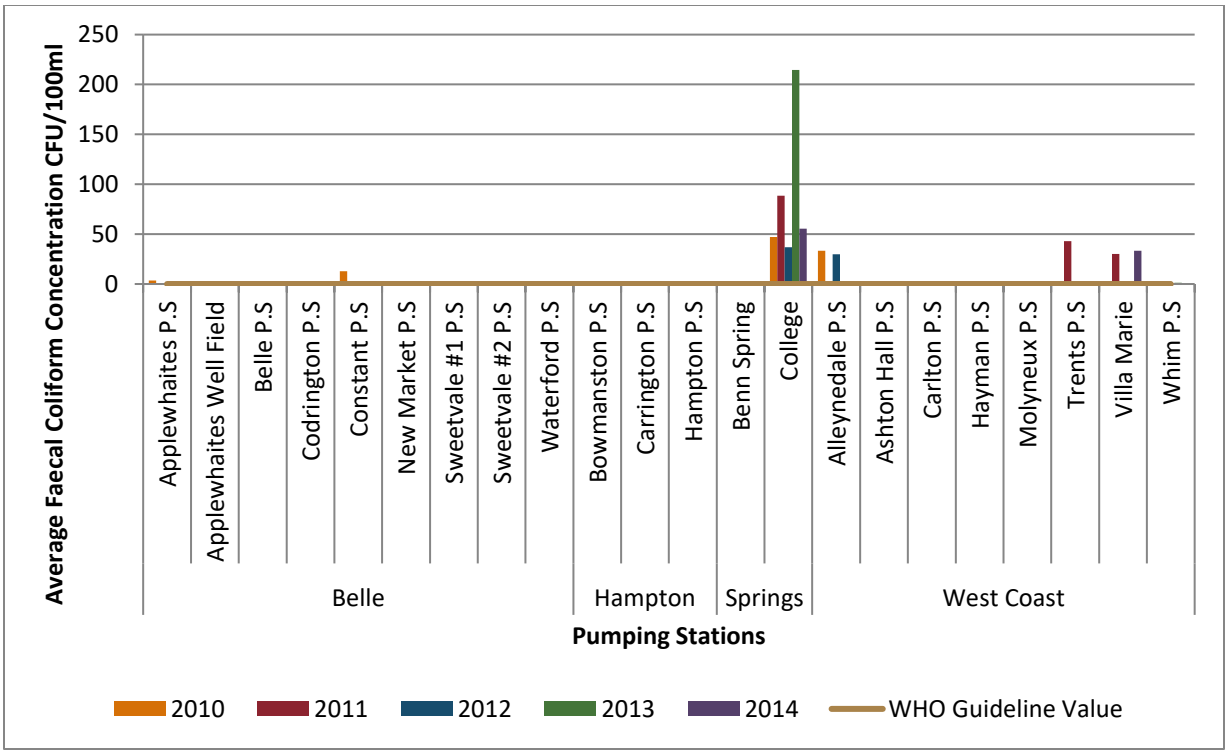

FIGURE 15: AVERAGE CONCENTRATIONS OF FAECAL COLIFORM FOR SUPPLY SOURCES OVER THE PERIOD 2010-2014

9.1.6 DISCUSSION

Residual chlorine data is only available for the wells sampled by the EPD. There is no information available for wells sampled by the BWA. Requests have been made to the BWA regarding the submission of the data. To date, none of this information has been received.

Due to the automatic pumping mechanism at some of the agricultural wells, the collection of samples is not possible if the pump is not on at the time of sample collection. There are no manual over-rides for these systems. The BWA has fenced the pumping station at Sweetvale 2. No provisions have been made to grant access to EPD personnel or for an alternate sampling point. Requests for the provision of alternative arrangements to facilitate the resumption of sample collection have not yet been addressed.

9.2 MONITORING OF NATURAL SPRINGS

All-natural springs (Fortesque, Porey Spring, Pot House and Three Houses) had chloride concentrations above the guideline value of 250 mg/L (Figure 16). With regards to Nitrate-N, the values were below the guideline for all springs (Figure 17). In relation to

faecal coliform, all springs exceeded the limit of 0 CFU/100 ml with the highest being Three Houses with 809 CFU/100 ml (Figure 18).

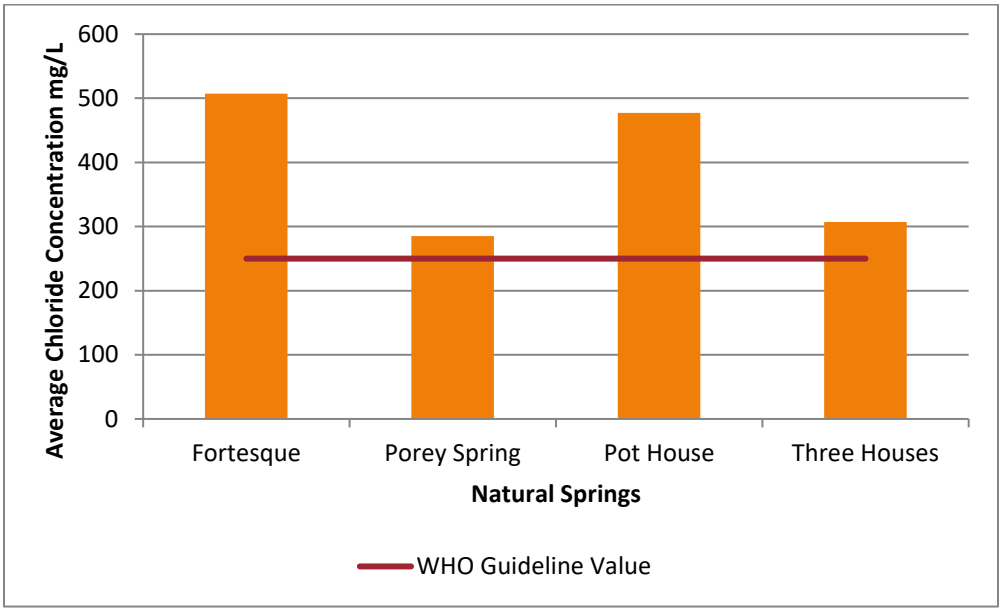

FIGURE 16: AVERAGE CHLORIDE CONCENTRATION FOR NON-PUBLIC SUPPLY SPRING IN 2014

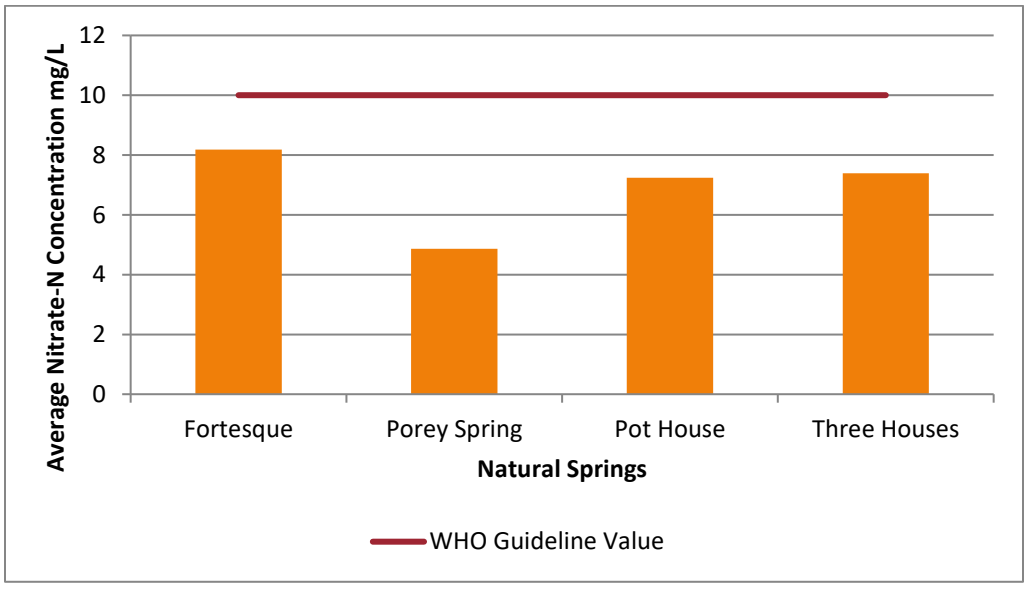

FIGURE 17: AVERAGE NITRATE-N CONCENTRATIONS FOR NON-PUBLIC SUPPLY SPRINGS IN 2014

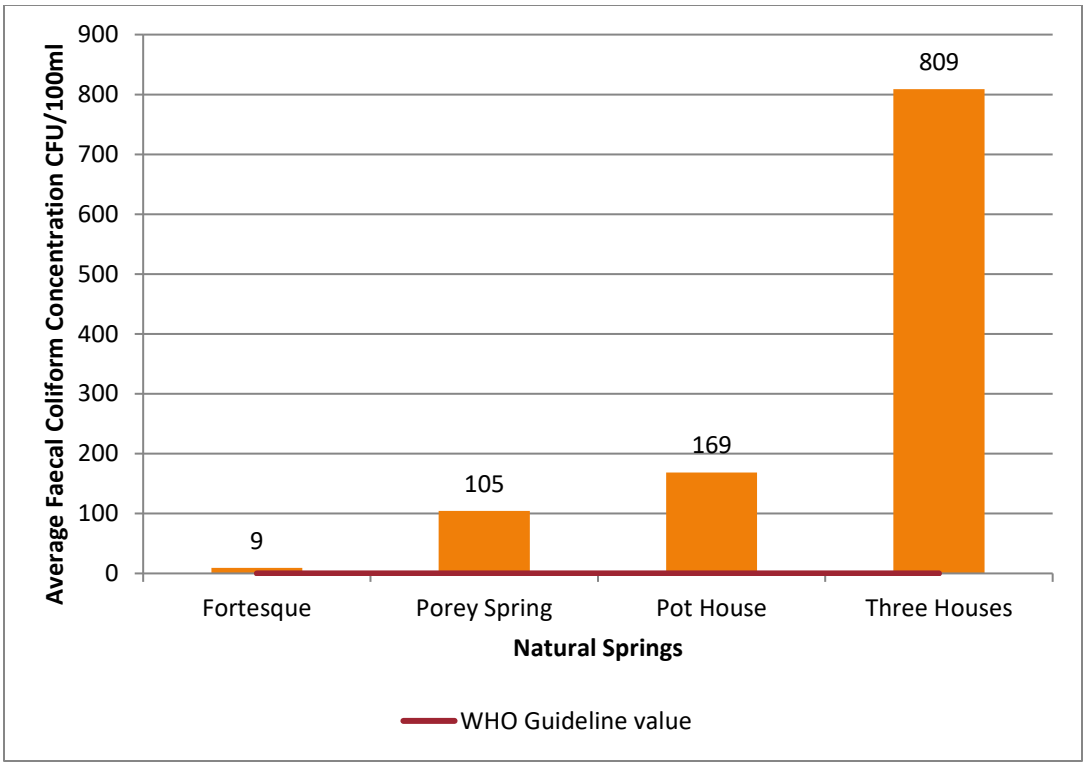

FIGURE 18: AVERAGE FAECAL COLIFORM CONCENTRATIONS FOR NON-PUBLIC SUPPLY SPRINGS IN 2014

No samples were collected from Bath Springs for the latter part of the year as the entrance had become overgrown with vegetation and is now impassable.

9.3 NEAR-SHORE MONITORING

One thousand nine hundred and fifty-seven (1,957) samples were collected under the Near-shore Monitoring Program in 2014. Of these, eight hundred and twelve (812) samples were collected from the West Coast Beaches while one thousand one hundred and forty-five (1,145) samples were collected from the South Coast.

Sampling activities were prematurely suspended due to the shortage of filters which are necessary for analysis. This situation was precipitated by a delay in the receipt of filters which had been ordered earlier in 2014. As a resulted no sampling activities were conducted after November 12th 2014.

Results of the sample analysis were compared with the proposed ambient standards in the List of Prohibited Concentrations under the Marine Pollution Control Act CAP392A for microbiological and select physicochemical and nutrient parameters.

9.3.1 MICROBIOLOGICAL ANALYSIS

The criteria for two of the parameters in the proposed List of Prohibited Concentrations under the Marine Pollution Control Act, CAP392A are outlined in Table 9.

TABLE 9: MARINE QUALITY PARAMETERS AND PROPOSED AMBIENT STANDARDS

Parameter	Standard
Enterococci	The geometric mean of a minimum of 5 samples should not exceed 35 colonies/100ml in any 30-day period. AND No sample should exceed 104 colonies/100ml
Faecal Coliform	The geometric mean of a minimum of 5 samples should not exceed 200 colonies/ 100ml in any 30-day period. AND No more than 10% of samples exceed 400 colonies/100ml

In 2014, none of the beaches sampled exceeded the standard for Faecal Coliform. However, with respect to Enterococci, only Coach House Beach exceeded the standard in February 2014 with a geometric mean of forty (45) CFU/ 100 ml. All other beaches were compliant with the proposed standards.

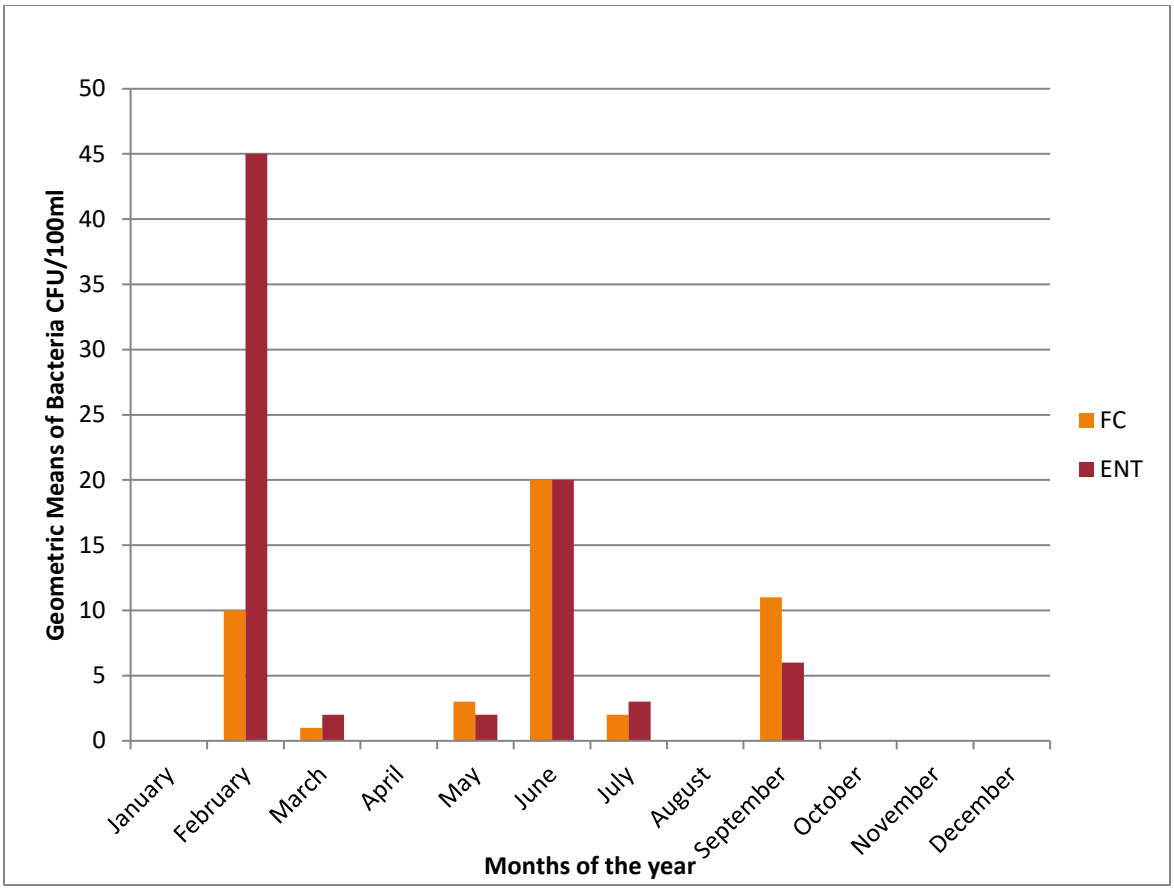

FIGURE 19: GRAPH OF GEOMETRIC MEANS FOR FAECAL COLIFORM AND ENTEROCOCCI VS MONTHS OF THE YEAR FOR COACH HOUSE BEACH

9.3.2 PHYSICOCHEMICAL AND NUTRIENT PARAMETERS

Samples were analysed for the physicochemical parameters; pH, total suspended solids (TSS) and nutrients: total nitrogen and total phosphorous. The results of the analysis were compared to the proposed List of Prohibited Concentrations under the Marine Pollution Control Act CAP392A. Table 10 shows the standards for the physicochemical and nutrient parameters used in the monitoring programme.

TABLE 10: THE STANDARDS FOR THE PARAMETERS ANALYZED IN THE 2014 SAMPLING PROGRAM

Parameter	Ambient Water Quality Standard
Total Nitrogen	0.1 mg/L
Total Phosphorous	0.015 mg/L
pH	7.0 - 8.7
Total Suspended Solids (TSS)	5 mg/L
Turbidity	1.5 NTU

All of the beaches exceeded the standard for total phosphorous (0.015 mg/L) and turbidity (1.5 NTU). All beaches were in compliance with respect to the pH. Sixty-six per cent (66 %) of the samples did not exceed the standard concerning TSS. The majority (77 %) of the nearshore marine samples taken exceeded the total nitrogen standard of 0.1 mg/L.

In relation to turbidity, the highest value was 8.6 Nephelometric Turbidity Units (NTU) for Holetown on October 6, 2014, and the lowest was 1.9 NTU for Brandons on January 6, 2014.

For Total Suspended Solids (TSS), the highest value was 160 mg/L for Batts Rock on October 14, 2014, and the lowest was 0.23 mg/L at Brighton on January 6, 2014. Forty-five (45) out of the one hundred and twenty-six (126) samples taken exceeded the standard.

With respect to total nitrogen, a total of one hundred and twenty-three samples (123) were analysed. Twenty-eight (28) samples complied with the standard, ninety-five samples (95) exceeded the standard and there were no results for three samples.

The pH readings for nearshore water quality samples collected in 2014 ranged from 7.80 to 8.40 which is the same range as in 2013. Both Dover on May 14, 2014, and Paradise on July 28, 2014, had the highest recorded values of 8.40 and Batts Rock on May 12, 2014, had the lowest value at 7.80.

9.4 Data Verification and Database Management

To ensure the accuracy and reliability of the Department's water quality data, the WQS developed the Data Verification and Database Management sub-programme. This activity involved the auditing of all water quality data collected during the Department's regulatory programmes such as the groundwater and nearshore monitoring programme, reporting and correcting any discrepancies. Correction of discrepancies involved the updating of the requisite database and or requesting the re-issuance of laboratory certificates.

The programme commenced in July 2014 and the review of the groundwater and marine water quality datasets for January to July 2014 and January to December 2013 were completed by December 2014.

During the review, seven hundred and sixty-one discrepancies have been identified and one hundred and twenty-one laboratory certificates have been requested to be reissued from the Public Health Laboratory and the Government Analytical Services.

It should be noted that the verification of historical data may be impeded as both the Government Analytical Services and the Public Health Laboratory at the Winston Scott Polyclinic only retain records for seven years. As a result, the verification of data within the historical dataset outside of those periods will not be possible.

9.5 National Antibiotic-Resistant Bacteria Project

In 2013, the EPD commenced a national assessment of the prevalence and distribution of antibiotic-resistant strains of indicator organisms in various water sources in Barbados. These sources included marine, groundwater, domestic water sources, surface waters and select wastewater sources.

The project was conducted in two (2) phases with Phase 1 involving sample collection and sample analysis for the presence of the antibiotic-resistant Enterococci, E. Coli and Faecal Coliform. Klebsiella isolates were also collected in the first phase and preserved for future analysis. In 2014, the harvested Klebsiella isolates from Phase 1 were analyzed to determine their level of resistance to commonly used first and second-generation antibiotics.

The final draft of the project report was submitted by the consultant and includes the results of Phase 2 of the study.

9.6 Septic Tank and Filter Bed Assessment

In 2013, the EPD in collaboration with the Centre for Resource Management and Environmental Studies (CERMES) undertook research to determine the efficacy of septic tank designs and how the design affected the performance of the system and the resultant discharge. The assessment was carried out by a Masters student supervised by the EPD and CERMES. Due to shortcomings with the research, the project will need to be reassessed and redone.

9.7 Widescreen Groundwater Monitoring Program

This programme involves the biannual collection of water samples from potable wells for analysis of parameters which are not normally assessed in the routine groundwater monitoring programme. Parameters such as heavy metals, hydrocarbons and Persistent Organic Pollutants are analysed under this programme.

Widescreen sampling was conducted on March 25th 2014 at the Belle, Hampton, Applewaites, Carlton and Haymans public supply wells. Cadmium, Antimony, Beryllium, Chromium, Mercury, Nickel, Nitrites, Cyanide, Selenium, Thallium, Arsenic, Lead, asbestos and Dioxins were not detected at any of the sites. Nitrate-N concentrations at all the sites were below the WHO guideline value of 10mg/L. The Barium

concentration was below the WHO guideline value of 0.7 mg/L. Bromoform and Dibromochloromethane were below the WHO guideline value of 0.1mg/L. The concentrations of chlorides, fluorides, copper, zinc, sodium, iron, manganese, silver and sulphates were below the WHO guideline values.

The second collection of samples was postponed due to the extended delay in receipt of a Local Purchase Order (LPO) to facilitate the shipment of samples.

9.8 WASTEWATER MONITORING PROGRAMME

This programme was not carried out in 2014 due to budgetary constraints, logistical challenges pertaining to sample analysis and human resource limitations of the EPD. No date has been set for the resumption of the programme.

9.9 LOOKING FORWARD

Routine monitoring of groundwater and the nearshore environment will continue in 2015. A widescreen sampling of potable wells will be carried out as scheduled in 2015.

10 TRAINING, CONFERENCES, SEMINARS AND WORKSHOPS

The Environmental Protection Department seeks to increase the human resource capacity of its staff through training and attendance at conferences and workshops. The entire department is targeted for the provision of these opportunities as an enhancement at all levels will improve the overall performance.

10.1 TRAINING

The training which was conducted locally, for the most part, consisted of courses provided by the Training Administration Division (Table 11, Appendix). These courses topics included Performance Review and Development (PRDS) and Introduction to Microsoft Access among others. There was also safety and health training which was provided by the Labour Department which was attended by the majority of staff.

During 2014, staff training also included webinars hosted by the Secretariat of the Basel, Rotterdam and Stockholm Conventions. Webinars are a useful tool for staying up to date with the activities of the various conventions.

With respect to overseas training, staff participated in an International Maritime Organization Regional Workshop and a workshop related to the Sustainable Cities Initiative (Table 12, Appendix).

10.2 CONFERENCES, WORKSHOPS AND MEETINGS

Several conferences, workshops and meetings were also attended locally by staff as shown in Table 13 (Appendix). Most of the local conferences, seminars and workshops attended dealt with the Sustainable Cities Initiative. Workshops dealing with climate change were also attended by staff of the EPD.

Of note was the first meeting for National Emergency coordinators organized by the Organisation for the Prohibition of Chemical Weapons (OPCW) with support from the Government of the United Kingdom to develop a regional response capability in the Caribbean Region was held on April 1 and 2, 2014.

This meeting brought together emergency coordinating personnel from nine (9) CARICOM countries and the objectives of the meeting were:

1. To establish a draft regional capability matrix
2. To establish a regional capacity framework and gap analysis

3. To define a regional concept of operation
4. To draft a plan of action for the creation of a Regional Chemical Response Capacity.

This meeting laid the foundation for the establishment of national chemical emergency response programmes which would be used for the creation of regional plans.

With respect to the overseas conferences, one was related to the Cartagena Convention and the other pertained to the Stockholm Convention on Persistent Organic Pollutants (Table 14, Appendix).

11 APPENDIX

TABLE 11: TRAINING UNDERTAKEN BY STAFF LOCALLY

Name of Course/ Activity	Location/ Date	Description	Officers (s) In Attendance
Performance Review and Development	January 20-27, 2014/ Training Administration Division(TAD), Warrens Tower II, Warrens, St. Michael	To familiarize persons with PRDS.	• A. Eversley – Senior Marine Pollution Officer (ag.) • S. Goodridge – Senior Environmental Technician (ag.)
Management Development for Executive Secretaries	February 10-14	Course content included the role of the Executive Secretary in the Public Service, critical management skills, communication and interpersonal skills, diary and document Management and use of technology	• A. Boxill – Secretary
Developing National Implementation Plans under the Stockholm	March 6, 2014/Online	To provide an overview of parties' obligations when a new POP is listed, share and exchange of information on guidance documents and provision of information on training and capacity building activities	• L. Senhouse – Senior Environmental Technical Officer
Finance for Non-Finance Managers	March 10-14, 2014	The course included; understanding accounting and finance, the purpose of financial statements, financial statements and performance indicators, estimates and the budgeting process in the public sector and the Regulatory Framework	• I. Lavine – Deputy Director (ag.)
Hazardous Materials Awareness	March 10 to 14, 2014/Airport Fire Station Training Room	Course content included hazardous material identification, managing the incident and personal protective equipment.	• T. Armstrong – Senior Environmental Protection Officer
Safety and Health at Work Training	April 15 & 17/EPD		• Various staff members attended the seminar.
Programme Budgeting	May 15/EPD		• S. Goodridge

			• P. Pile • L. Senhouse • I. Lavine • T. Armstrong • D. Gittens • K. Barrow • C. Clarke • M. Small • T. King • A. Eversley
Performance Review and Development	May 19-23, 2014/ TAD, Warrens Tower II , Warrens, St. Michael	To familiarize persons with PRDS.	• T. Armstrong – Senior Environmental Protection Officer • D. Gittens – Senior Environmental Protection Officer
General Housekeeping	June 3 to 6, 2014/ TAD	Course content comprised the participant's role in the organisation, care of equipment, ethics in the workplace, food hygiene, preparation of light snacks, proper tray service and personal care and etiquette	• Y. Howell – Maid (ag.)
Performance Review and Development for Managers/ Supervisors	June 23-27, 2014	To familiarize managers and supervisor of their roles under PRDS	• P. Agard – Clerical Officer
Performance Budgeting Workshop	July 16-17, 2014, 3RD Floor, Baobab Tower, Warrens, St. Michael		• K. Barrow- Chief Building Development Officer (ag.)
Communication and Interpersonal Skills	August 6 &7/ TAD, Warrens Tower II , Warrens, St. Michael	Course content consisted of the types of communication, techniques for developing interpersonal skills, barriers to effective communication and suggestions for reducing or removing barriers to effective communication.	• R. Best – Clerk Typist

Performance Review and Development for Managers/ Supervisors	August 11 to 15, 2014/ TAD, Warrens Tower II, Warrens, St. Michael	To familiarize managers and supervisor of their roles under PRDS	• A. Deane – Building Development Officer • A. Boxill – Secretary
Ebola Training	August 28, 2014/ Lloyd Erskine Sandiford Complex, St. Michael		• N. Cummins – Environmental Inspector • L. Chapman – Environmental Technician
Performance Review and Development for Managers/ Supervisors	September 8 to 12, 2014/ TAD, Warrens Tower II, Warrens, St. Michael	To familiarize managers and supervisor of their roles under PRDS	• A. Headley – Director (ag.)
Climate Change Impact Assessment	September 11/Caribbean Institute for Meteorology and Institute		• L. Chapman – Environmental Technician
Introduction to Computer Applications	September 22-30, Barbados Defence Force, St. Ann's Fort, The Garrison, St. Michael	Course content included computer concepts, Windows 7 operating systems, introduction to Microsoft Word, introduction to the internet and using Internet Explorer, including email	• G. Drakes – Draughtsman Technician
Initial Capacity-Building for Greenhouse Gas Emissions Mitigation Assessment	October 9, 2014		• S. Goodridge – Senior Environmental Technician
Introduction to Public Service Management	October 20 -31, TAD, Warrens Tower II, Warrens, St. Michael	Subject areas covered included essentials of Management, rules and regulations, management of self, leading the group/ team, monitoring the progress and quality of work, health and safety and management of Team Projects.	• L. Senhouse – Senior Environmental Technical Officer (ag.)
Industrial Relations Management	October 21-23/ TAD Radisson Hotel, Aquatic Gap, St. Michael	The aim was to enhance the knowledge and skills of deputy permanent secretaries, heads of departments and senior administrative officers in the area of	• A. Headley – Director (ag.)

		industrial relations do that they can demonstrate sound industrial relations practices	
Managing the Human Resources Function	October 29 to 31, TAD, Warrens Tower II, Warrens, St. Michael	Covered the roles of senior staff as the primary persons responsible for staff development matters and the legislative and regulatory framework and the associated areas to be used in the execution of the duties of human resource managers	• I. Lavine
Effective Presentation Skills	November 17-21, 2014/ TAD, Warrens Tower II, Warrens, St. Michael	The course covered areas such as using, planning for impromptu and planned presentations and using MS PowerPoint and flip charts.	• A. Reeves – Environmental Technical Officer
Introduction to Microsoft Access	November 17-25, Baobab Towers, Warrens, St. Michael	Some of the areas covered include creating and editing tables, finding and filtering data, creating and running queries, modifying query results, creating and running a Data Entry Form, using the Switchboard and creating and running a report	• J. Yearwood – Environmental Technician • C. Griffith – Environmental Inspector

TABLE 12: OVERSEAS TRAINING COMPLETED BY STAFF IN 2014

Name of Course/ Activity	Date/Location	Description	Officers (s) In Attendance
IMO/ Regional Workshop for the Promotion of the London Protocol	May 19-20 New Orleans, USA	The workshop sought to sensitize relevant authorities to the implications of ratifying, implementing and enforcing the London Protocol	• I. Lavine – Deputy Director (ag.)
Challenges for the Implementation of the Sustainable and Emergent Cities Initiative in Latin America: approach, methodology and tools	August 18-20, 2014, Costa Rica	Training on the indicators to be used in the ESCI	• I. Lavine – Deputy Director (ag.)
Master of Science Energy and Environment	September 1, 2013- September 30, 2014, Leeds UK	Provides graduates from diverse engineering, scientific and technical backgrounds with expertise in new and traditional energy technologies, renewable sources of energy, solid waste recycling, air pollution and climate change, and energy management systems.	• C. Worrell – Marine Pollution Officer (ag.)

TABLE 13: LOCAL CONFERENCES, WORKSHOPS AND MEETINGS ATTENDED BY STAFF

Name of Course/ Activity	Date/Location	Description	Officers (s) In Attendance
Third Ordinary Meeting of the Steering Committee of the Basel Convention Regional Centre for the Caribbean Region	January 15, 2014	Review the implementation of 2012/2014 Business Plan and audited financial statement and discuss ongoing and planned projects.	• A. Headley – Director (ag.)
Teleconference Meeting of the Working Group on Monitoring and Assessment Protocol Concerning Pollution from Land-Based Sources	Monthly	To review and discuss the results of the Water Quality Monitoring Survey	• A. Headley – Director (ag.)
Online Training Workshop on the Use of the Non-Annex I Greenhouse Gas (GHG) Inventory Software (NAIIS)	March 24-28, 2014 /Online	Theory and hands-on sessions on the use of the GHG Inventory software (NAIIS)	• S. Goodridge – Senior Environmental Technician
OPCW Assistance and Protection Caribbean Region Project National Emergency Coordinators	April 1-2, Radisson Hotel, Barbados	To develop a regional response capability	• A. Headley – Director (ag.) • T. Armstrong – Senior Environmental Protection Officer (ag.)
Climate Change Adaptation to Protect Human Health	June 12	To solicit contributions from various government departments for an Educational Workbook and Resource book that will be used in primary and secondary school	• D. Gittens – Senior Environmental Protection Officer (ag.)
Video Conference on Barbados ' indicators for the Emerging and Sustainable Cities Initiative (ESCI)	June 16, 2014, Inter-American Development Bank, Welches, Christ Church	Discussion of the indicators to be used in the ESCI	• I. Lavine – Deputy Director (ag.)

Workshop to raise awareness among stakeholders about CARREX - the CARICOM Rapid Alert System for Exchange of Information on Dangerous (non-food) Consumer Goods.	August 14 to 15, 2014 Lloyd Erskine Sandiford Centre	The CARREX system facilitates the sharing of information amongst CARICOM states to raise awareness about consumer products that pose a risk to health and safety or the environment. This information would allow measures to be implemented to protect the environment from the effects of those products. Such a system also has the potential to support the implementation of the Stockholm Convention	• Philip Pile – Environmental Technical Officer
Implementation of the Emerging and Sustainable Cities (ESCI) in the City of Bridgetown, Barbados Special Mission to Barbados	October 6-9,2014	The purpose of the mission was to review and discuss the technical inputs for the urban sustainability studies and the data requirements for the application of the methodology leading to the emerging and sustainable cities Action Plan for Bridgetown	• I. Lavine – Deputy Director (ag.)
Implementation of the Emerging and Sustainable Cities (ESCI) in the City of Bridgetown, Barbados Administration Mission	December 9-11, 2014, IDB Barbados Country Office	An administrative missions to discuss the various indicators to be used in the Initiative	• I. Lavine – Deputy Director (ag.)

TABLE 14: OVERSEAS CONFERENCES AND WORKSHOPS ATTENDED BY STAFF IN 2014

Name of Course/ Activity	Date/Location	Description	Officers (s) In Attendance
Regional Validation Workshop for the "Development and Implementation of a Sustainable Management Mechanism for POPs in the Caribbean	September 25 to 26, 2014 Port of Spain Trinidad and Tobago	The workshop was used to finalise all of the technical, administrative and financial elements of the project	• L. Senhouse – Senior Environmental Technical Officer
Sixteenth Annual Meeting of the National Authorities(NAs)	November 27-30, 2014,Hague Netherlands	Review implementation activity of NAs and sharing experiences	• A. Headley – Director (ag.)