
RESPONSE TO REGULATIONS FOR DISPOSAL OF OFFENSIVE MATTER IN BARBADOS, WEST INDIES

ARCHER, ARTHUR B.

Project Manager, Sewerage and Solid Waste Project Unit, Ministry of Health, Barbados

SUMMARY

The small developing Island of Barbados in the Eastern Caribbean is experiencing high level environmental and public health standards which are largely responsible for its vibrant tourism industry, which is a major contributor to the country's economy through the pristine quality of coastal marine waters and generally good sanitary conditions island-wide. See Map of Barbados at Figure 1.

The Statutes and personnel spearheading the improvement of Public Health and environmental conditions during the post-fifth decade of this century were the Health Services (Disposal of Offensive Matter) Regulations, 1969, enforced by the country's first Environmental Engineer, and the Environmental Engineering Division of the Ministry of Health (Established 1972) assisted by the Public Health Inspectorate and the Town and Country Planning Department. Significant assistance in the enforcement of the Regulations was through the "Ground Water Protection Policy" primarily directed by the Barbados Water Authority as a protective measure for the country's ground water supply and concomitantly general sanitation.

However, with a positive response to the regulations, coupled post-1960 heavy increase in coastal development, the Government of Barbados is currently undertaking the construction of coastal sewerage system to arrest biological damage to fringing coral reefs and nearshore fisheries.

1 BARBADOS—PHYSICAL AND DEVELOPMENTAL FEATURES

Barbados is the most easterly of the chain of Lesser Antilles Caribbean Islands with its eastern, south-eastern and north-eastern coasts on the Atlantic Ocean. The area of the Island is 166 sq. miles (430km²), comparatively flat, the highest point, Mt. Hillaby, 1104 ft (336.5m) above sea-level, with a sub-surface geological structure of 85% coral limestone, with the remaining 15% on the eastern part of the island being a conglomerate, mainly of clays, shales and some coral limestone.

The coastal areas are virtually totally of coral sand and stone with numerous coral reefs, both nearshore fringing reefs and offshore bank reefs. Former areas of mangroves forests have virtually become extinct.

1.1 Population

The current population of Barbados (1990 Census) is approximately 260,000, with virtually 50% residing in the southern and western parishes of St. Philip, Christ Church, St. Michael, St. James and St. Peter. The coastal areas of southern, western and Bridgetown City are the major areas of Tourism and Commercial Development. It is in these areas where most wastes, liquid and solid, are generated, and which receive the major attention for the protection of coastal and marine areas as well as urban development control.

2 PRE-1970 WASTE MANAGEMENT AND DISPOSAL PRACTICES

During the early years of the country the standard of living in Barbados was quite low. The vast majority of the population was of the labouring class, with crude methods of disposal of wastes.



Figure 1. Barbados.

The main methods of excreta storage was by the pit privy and the pail (bucket) closet. Disposal of excreta was either by burial on the residential site, and in many cases the waste was transported in barrels, and pails from pail closets, to beaches, the littoral zone of the coast, provided transportation was done after 9.00 p.m.

Other offensive matter such as dead animals, putrescible solid waste and raw sewage were clandestinely disposed in drains, watercourses and fields. Running water was mostly installed by the minority middle to upper class, but disposal of water-borne waste e.g. crude sewage and grey water was somewhat uncontrolled, the beach and nearshore marine area, and public drains being common vehicles of the wastes. There were however, in the majority receptacles of water-borne waste, the sewage wells; most inland ones dug to fissures in limestone which provides often a long-term (years) of disposal.

2.1 The 1950 to 1970 decades

The post-war (1939-45) period saw a greater awareness of the population, at all levels, of the need for improved standards of living with a greater awareness of the importance of personal hygiene and sanitation. there was a steady increase in the installation of running water, with water-borne disposal systems.

The 1960s saw a continuing increase in commercial development mainly in the City of Bridgetown, with also a greater awareness of the national economic benefits of tourism. The industrial sector began to take root and an Industrial Estate was established in the Bridgetown sea-port area.

With a greater awareness of the public health and environmental problems in the country, particularly in the densely developing coastal and urban areas, the Barbados Government in 1965 sought the assistance of a firm of Engineering Consultants, who in 1921 and 1945 had recommended and planned (in 1945) a sewerage system for the City of Bridgetown and its suburbs. At this latter stage (1965), The Consulting Firm recommended the installation of septic tanks at the large heavily occupied commercial properties, with effluent disposal into dug wells.

The Bridgetown City area, with a mixture of commercial property and low-income homes gradually became a City with somewhat odourous conditions, because the high water-table in the City area, and septic tanks did not adequately absorb effluents, with the resultant overflow of wells entering open public storm drains. In some cases package sewage treatment plants were installed with the effluents discharged directly into the open drains, with the effluent flowing on the beaches and into the sea. There were also several commercial buildings where crude untreated wastewater was disposed into the urban estuary, the Careenage.

3 ENACTMENT OF THE HEALTH SERVICES (DISPOSAL OF OFFENSIVE MATTER) REGULATIONS 1969

With the increasing environmental problems due to failure of property owners to improve waste disposal problems, and the slow process of enforcing existing by-laws enacted by Local Government Agencies to cope with the rising problems of the 1960s, the Central Government also for other administrative reasons, abolished the Local Government agencies and placed public health and environmental improvement as the responsibility of the Ministry of Health.

In the year 1969 the Health Services (Disposal of Offensive Matter) Regulations were enacted with the strict instruction to execute its enforcement. During the year, marine water quality monitoring in the areas off Bridgetown City was undertaken, with the objective of assessing the bacteriological quality of Carlisle Bay and the adjacent littoral areas and beaches. Several storm drains were point sources which impacted on beaches and the bay, often with faecal or decomposing organic matter. But discharges of crude sewage and septic tank effluent being discharged into the sea, along with some excreta disposed on beaches included:

- Holiday Inn: Untreated comminuted sewage pumped approximately 700 feet offshore.
- St. Michael District Hospital and Government Headquarters: Crude sewage discharged in the surf off the Esplanade.
- Fish Market, Bay Street: Septic tank effluent discharged to sea via Brownes Beach.
- Ministries of Health and Education Compound: Septic tank effluent piped 300 feet offshore into Bay.
- Queen Elizabeth Hospital: Untreated comminuted sewage pumped 1000 feet offshore in Carlisle Bay - approximately 1000,000 gallons per day (gpd).
- Lewis Alley, Bay Street: Contents of Privy Pit dumped in surf or on the beach.
- Government Abattoir: Septic tank effluent and slaughter house waste discharged 60 ft. offshore by pipeline.

See coastal point sources locations at Figure 2.

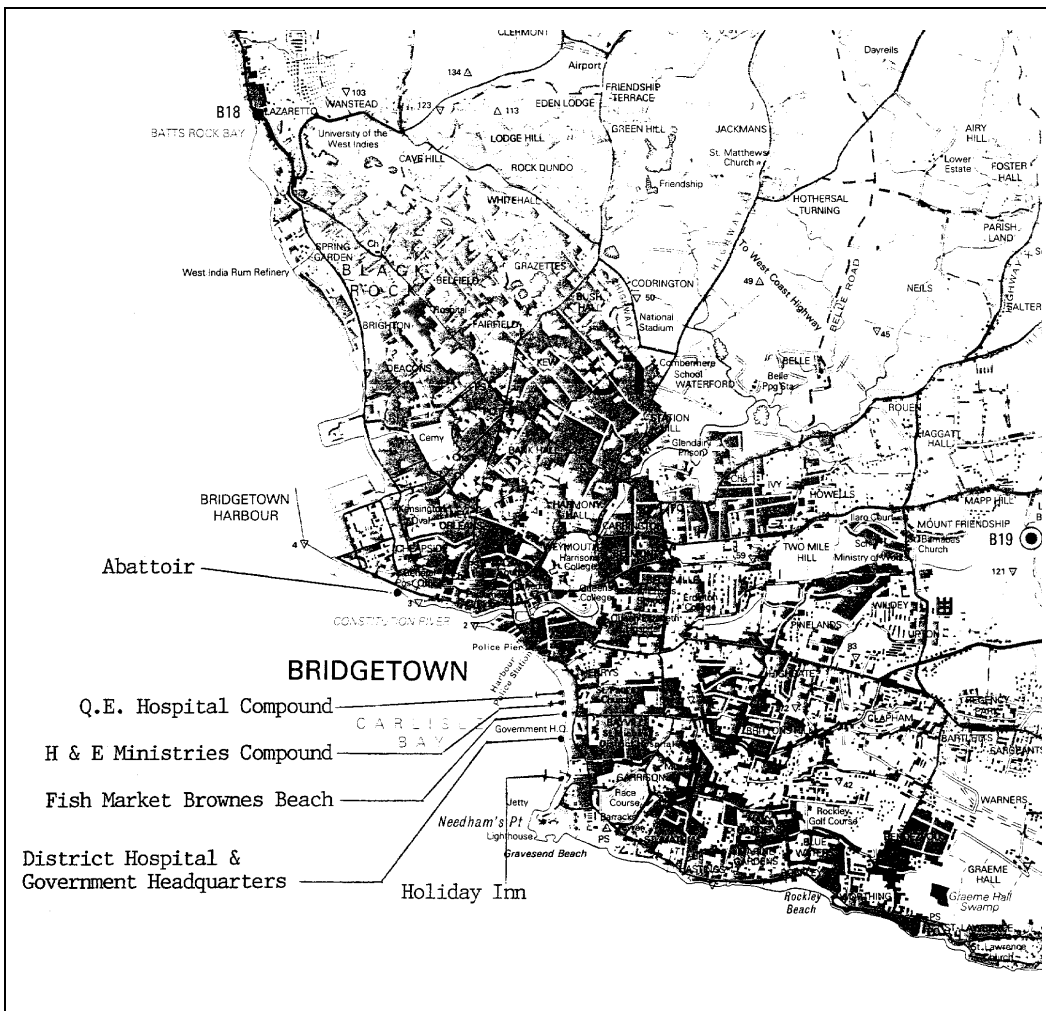


Figure 2. Coastal point sources of waste water discharges in Carlisle Bay.

The results of water quality sampling off the beaches adjacent to Carlisle Bay show the very high level of bacteriological pollution on December 10, 1969. See Table 1.

3.1 Enforcement of (Disposal of Offensive Matter) regulations, 1969

With the high levels of bacteriological pollution analysed in samples from the Carlisle Bay as well as other adjacent marine areas, restrictive and prohibitive action was taken to meet the requirements of the Disposal of Offensive Matter Regulations. Conditions imposed included:

Table 1. Coliform Counts from Bacteriological Analysis of Marine Samples Taken off the Beaches of Carlisle Bay: December 10, 1969

Source	Time	Coliforms/100cc (Total)	Remarks
Near Queen Elizabeth Hospital Jetty	10.00 a.m.	10,000	Very high
Between Lewis Alley and Queen Elizabeth Hospital Jetty	10.05 a.m.	6,000	Very high
14th August 1968			
Midway between Esplanade and change rooms, Gravesend	6.45 a.m.	NIL	High tide
Between change rooms and Holiday Inn	1.35 p.m.	1,370	Low tide - possible pollution from bathers
Reece's Beach	6.05 a.m.	NIL	
2nd August 1968			
Off Harbour Police Station	6.15 a.m.	2,170	110 faecal coliforms indicative of excreta disposal
	10.13 a.m.	2,600	
	3.15 p.m.	390	Die off towards afternoon
	7.15 p.m.	5,900	Evening disposal (W.C.'s) Late evening peak disposal
	9.05 p.m.	11,200	
Earlier Analysis in Same Areas - 10th December 1969			
25th July 1968			
Sea Pool area of Eye Hospital	6.15 a.m.	1,580	
	10.08 a.m.	660	
	12.55 a.m.	150	
	3.10 p.m.	NIL	
	6.10 p.m.	860	

Pattern of early morning peak, afternoon die away and late evening build-up of coliforms appear to have been common to the areas along lower Bay Street and Browne's Beach.

- Stoppage of disposal of sewage, sewage effluent and other offensive matter on beaches and into the sea, unless permitted by the Ministry of Health under conditions required by the Ministry;
- Properties may dispose of sewage by flow into a well at depths instructed by the Ministry of Health and Environmental Engineering Division personnel;
- At commercial properties and large residential buildings, the use of septic tanks with effluent disposal in soakaways/sewage wells were required;
- At hotels, apartment buildings, and public institutions where sewage flows exceed 3000 gpd and where limited land area prevented the use of additional septic tanks and disposal wells; Property and facility owners/agents were required to install package sewage treatment plants, the effluents from which are monitored for effluent quality.

3.2 Response to regulatory requirements

The response to the Statutory requirements of the Regulations was, in general, quite positive. No prosecutions were made and in many cases additional time was given to install the required plant and equipment. In the process of enforcement of the Regulations, Owners/Agents were reminded of the penalty of a fine not exceeding BDS\$5000 or imprisonment for a term not exceeding 12 months or both; \$200 for each day or part thereof during the period when the offence continues after a conviction is first obtained, was also enacted.

3.3 Inland responses

With the increasing coastal and urban development to meet the rapid development of tourism and its demand for coastal plant and other facilities, there was considerable attention paid to the enforcement of the regulations on coastal properties.

But in urban, suburban and rural areas, the requirements of the Ground Water Protection Policy (see Appendix 2) were and are still being enforced. Significant requirements to protect the country's sole source of potable water, ground water, were imposed, based on the Development Zoning system, established in 1964. Enforced sectors of the Ground Water Protection Policy include:

- The prohibition of new physical development in the Zone 1 Area. Restriction of the installation of water-borne waste systems at properties on-site before 1964 was mitigated by the requirement of the installation of an Activated Carbon-gravel Filter Bed to filter effluent from a septic tank. The filter bed was designed by A.B. Archer 1973.

There are five zones covering the island's terrestrial area. Zone 1 is within the "cone of influence" of the water supply well. Zone 2 is an area adjacent to the Zone 1 area where the use of a septic tank with effluent disposal into a well not exceeding 20 feet (6.1m). In Zone 3, no septic tank is required, but separate wells must be provided for sewage and grey water. Zones 4 and 5, nearer the coast has no restrictions, except for petrol and other industrial wastes.

Figure 3 illustrates the five (5) Ground Water Protection Zones. The Ground Water Protection Policy requirements are at Appendix 2.

4 INSTALLATION OF SEWERAGE SYSTEMS

With the installation of septic tanks and package sewage treatment plants there was the removal of crude sewage and excreta from the nearshore marine and coastal areas with the resultant significant improvement in the clarity and quality of coastal waters. However with results of marine

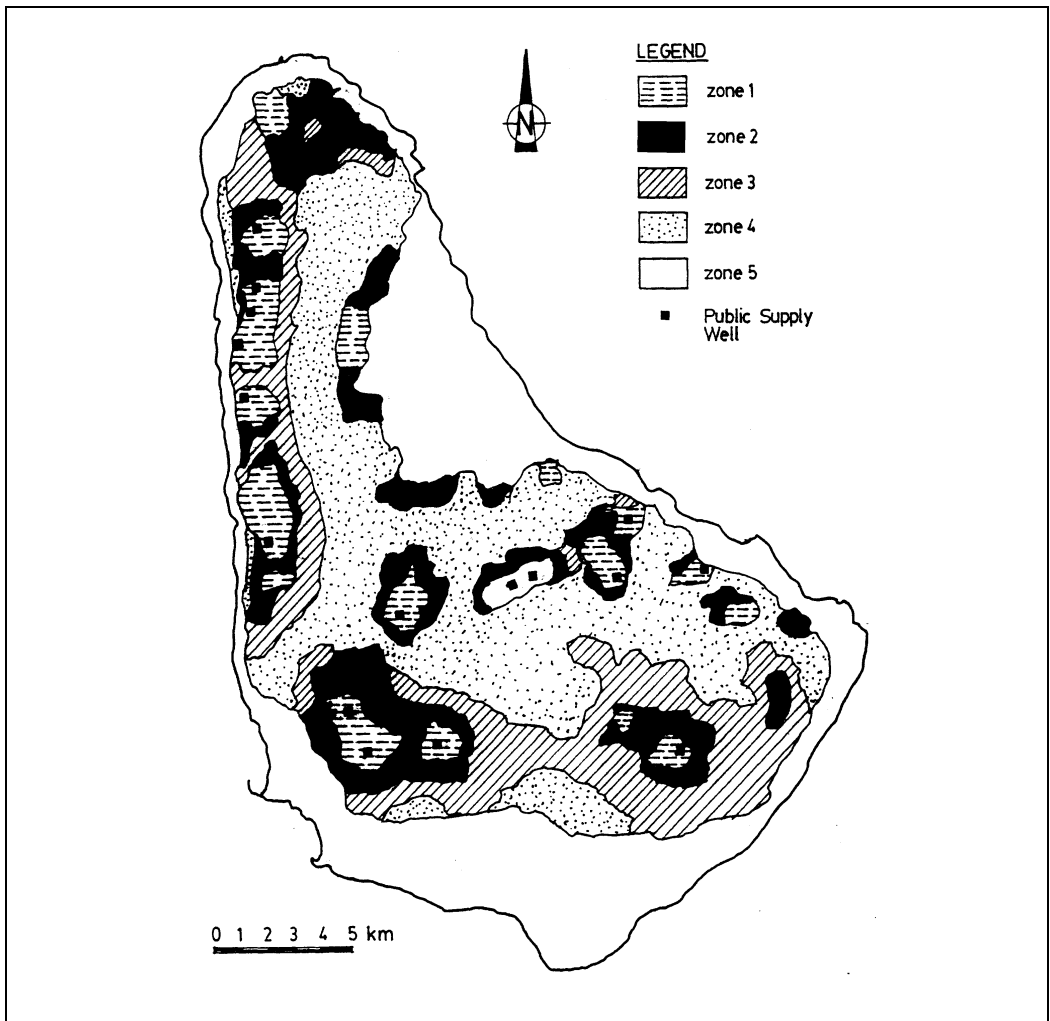


Figure 3. Barbados ground water protection zones.

biological studies done, mainly by the Bellairs Research Institute of McGill University, based on the Western Coast of Barbados, it was indicated that there was increasing levels of nutrients in the nearshore marine environment, consistent with increasing coastal and near-coastal physical development.

With the septic tank effluent disposal problems in Bridgetown, and the evidence of the elevated nutrient levels and the resultant proliferation of algal growth causing damage, and in some coastal areas disintegration of coral reefs with the resultant erosion of some beaches; in the year 1970, a prefesibility report on wastewater was prepared with the recommendation for a sewerage system for the City of Bridgetown.

The Government of Barbados approached the Inter-American Development Bank (IDB) for Technical assistance towards the installation of a sewerage system, and in the period 1973-74, the IDB assisted the Government with the funding of consultancy services to execute feasibility studies and final design for a Bridgetown sewerage system.

In 1976 the IDB provided a loan to the Barbados Government for the construction of a sewerage system in Bridgetown, and a Technical Cooperation Grant to establish a "Water and Sewerage Authority" to administer the operations of the sewerage system.

After the required project preparatory measures, including the engagement of a consulting firm for sewerage construction supervision, and contractors to execute three (3) contracts - sewage collection (sewer) system, sewage treatment plant, and a marine outfall - the system was constructed during the period March 1979 to June 1982.

4.1 Enforcement action

In the year 1980, after eleven (11) studies, including investigations into local administrative, financial and public reaction matters, the Barbados Legislature established the "Barbados Water Authority" to administer the country's water and sewerage services. With the establishment of the Authority Sewerage Regulations were enacted.

Of major importance in the sewerage regulations was the requirement for property owners to have their water-borne waste connected to the sewer system. There was an early response by commercial properties to the requirement to connect to the system. However, as time passed it became necessary for the Authority to execute the enforcement of the requirement to connect to the system. Under the Regulations, property owners are given 90 days to make provision for the connections, which were monitored by the Authority's technical personnel. On failure to connect, the Authority had the power to enter premises, make connections and recover cost through the law court.

The response to the requirement for connections was slow. But it was also recognized that the major residential areas in the area sewered were low-income, hence tolerance was exercised by the Authority and Central Government. Additionally in the contract between the IDB and the Barbados Government there was provision of a fund for the installation of "In-house Facilities" to allow low-income homes to connect to the system, which included a water-closet, shower and lavatory basin.

The sewerage system in Bridgetown, completely connected with the imposition of enforcement, and assistance to low-income areas, has developed one of the cleanest cities in the Caribbean, with the facility for increased commercial and industrial development, and has made Carlisle Bay and its adjacent marine areas one of the greatest pristine marine bathing areas in the world, with the return of corals and some fisheries. The environmental and development benefits of the coastal sewerage systems in dealing with offensive matter can comparatively be seen by thick algal growth and defoliated sea-grass at some other beaches, compared with the almost non-existence of such wastes indicators on beaches bordering Carlisle Bay. Table 2 demonstrates the improvement of the bacteriological quality of Carlisle Bay Coastal waters after the construction of the sewerage system with the removal of offensive sewage and effluents from direct point source disposal, and infiltration into the marine environment from coastal sewerage disposal wells and soakaways.

Indeed, with the enforcement of connections to the system, as early as 1984-85 an International firm of Consultants reporting on the marine quality of the Carlisle Bay area stated, quote:

"The fringe reefs have been long dead in Carlisle Bay and are matted with sand and rubble. However, encouraging new settlement of coral was observed in southern Carlisle Bay during diving programmes. This new coral settlement appears to have followed improvement of sewage treatment and/or removal of outfalls from the Northern Needham's Point area." unquote.

The enforcement of Disposal of Offensive Matter Regulations, 1969, and the Barbados Sewerage Regulations have been indicative of the need to stress to the public the importance of environmental and public health protective action. Today, because of the high standard of public health and environmental conditions in Barbados, Tourism is one of the major elements of sustainability of the economy of the country.

Table 2. Ministry of Health: Environmental Health Division Marine Water Quality Monitoring Programme Bacteriological Analysis Report

Date	Sample Site	Total Coliforms per 100 ml	Faecal Coliforms per 100 ml
1987			
27-07-87	Off Needhams Point	36	Nil
	Off Grand Barbados	20	Nil
	*Queen Elizabeth Hospital Jetty	28	Nil
	Bridgetown Sewerage Marine Outfall	40	Nil
25-04-87	Off Ice Factory - Bay Street	< 10	Nil
	Browne's Beach	< 10	Nil
	Off Esplanade (Former District Hospital outfall location)	< 10	Nil
16-05-87	Beach at Needhams (Off Hilton Hotel)	64	Nil
	Pebbles Beach	56	Nil
	Off Esplanade	75	Nil
	Brownes Beach	15	Nil
1988			
13-06-88	Off Hilton Hotel Outfall	600	Nil
	Off Grand Barbados Hotel	1,200	Nil
	Off City Sewerage Outfall	288	Nil
29-06-88	Off Hilton Hotel (Needhams Point)	136	Nil
	Pebbles Beach	72	20
	Bay Street Esplanade	124	Nil
	Browne's Beach (Off Fish Market)	488	Nil
05-08-88	Off Hilton Outfall (Needhams Point)	20	Nil
	Grand Barbados	< 10	Nil
	Queen Elizabeth Hospital Outfall Jetty	30	Nil
	City Sewerage System Outfall	< 10	Nil
14-10-88	Off Hilton Hotel (Needhams Point)	340	40
	Pebbles Beach	Confluent Growth	Nil
	Esplanade Beach	1,000	Nil
	Browne's Beach	220	Nil
18-11-88	Browne's Beach (Nr. Hospital Jetty)	80	Nil
	Brownes Beach (Off Fish Market)	40	Nil
	Browne's Beach (Nr. Esplanade)	Nil	Nil
05-12-88	Off Hilton Hotel (Needham's Point)	Nil	Nil
	Pebbles Beach (Nr. Mobil Office)	Nil	Nil
	Pebbles Beach (Nr. Grand Barbados Hotel)	100	Nil
	Browne's Beach (Nr. Esplanade)	4	Nil
	Browne's Beach (Off Fisheries Div. Office)	9	Nil
19-12-88	Hilton Hotel Beach	Nil	Nil
	Browne's Beach (Nr. Esplanade)	Nil	Nil
	Browne's Beach (Off Fisheries Div. Office)	Nil	Nil

Date	Sample Site	Total Coliforms per 100 ml	Faecal Coliforms per 100 ml
1989			
08-04-89	Browne's Beach North	100	Nil
	Browne's Beach South	320	Nil
24-05-89	Browne's Beach (Nr. Fish Market)	24	Nil
27-06-89	Off Hilton Hotel (Needham's Point)	Nil	Nil
	Pebbles Beach (Nr. Mobil Drain) ¹	2,280	Nil
04-07-89	Esplanade	310	Nil
	Browne's Beach South	126	Nil
	Brownes Beach North (Nr. Hospital Jetty)	172	Nil
28-08-89	Pebbles Beach (Nr. Grand Barbados)	10,000	N/A
	Esplanade (Nr. Fisheries Div. Office)	40	Nil
	Browne's Beach (Nr. Carlisle Centre)	600	Nil
	Browne's Beach (Nr. Hospital Jetty)	40	Nil
	Inshore of City Sewerage outfall	30	Nil
26-09-89	Off Hilton Beach	< 100	Nil
	Pebbles Beach	< 100	Nil
	Esplanade Beach	< 100	Nil
	Browne's Beach South	< 100	Nil
02-11-89	Off Hilton Beach	< 100	Nil
	Pebbles Beach (Midway)	< 100	Nil
	Esplanade	< 100	Nil
	Browne's Beach	< 100	Nil

The Government of Barbados is however aware of the need to increase the number of statutes to protect the environment and will shortly be enacting the required legislation, with the provision of personnel and monitoring facilities for enforcement. Such statutes include:

- A Litter Act
- Air pollution Regulations, to control vehicle and other emissions
- Hazardous waste Disposal Regulations. Note is made of the existing incinerator at the Caribbean's largest formulator of pesticides to dispose of containers and other items used in the formulation of pesticides/insecticides, which was installed in response to Health Regulations during the 1980s.
- Provisions for strengthening the "Pesticides Control Board" with authority to refuse the importation of pesticides barred in some countries where they are manufactured.

APPENDIX I

Health Services

J1 (Disposal of Offensive Matter) Regs., 1969 regs. 1.5

Health Services cap.44.

HEALTH SERVICES (DISPOSAL OF OFFENSIVE MATTER) REGULATIONS, 1969

Made by the Minister under section 10 of the Health Services Act.

1. These Regulations may be cited as the Health Services (Disposal of Offensive Matter) Regulations, 1969.
2. For the purposes of these regulations—"filth" includes any decomposing animal or vegetable matter; "night soil" means human excreta.
3. No person shall throw, deposit, let out or place any filth, night soil, dead animal or other offensive matter or thing of any kind on or about—
 - (a) the premises of another person;
 - (b) any water-course or beach;
 - (c) any public street, road, lane, alley, passage or thoroughfare;
 - (d) any other premises or place where such filth, night soil, dead animal or other offensive matter may create a nuisance or be detrimental to the public health.
4. No person shall, except with the approval of a Medical Officer of Health, carry any night soil through any public street, road, lane, alley passage or thoroughfare in any cart, vehicle or receptacle of any kind before the hour of ten o'clock in the evening and after the hour of six o'clock in the morning.
5. No person shall use any cart, vehicle or receptacle of any kind for the conveyance of any filth, night soil or other offensive matter of any kind unless such cart, vehicle or receptacle is staunch, tight and closely covered so as to prevent smell or leakage in or upon any street, road, lane, alley, passage thoroughfare or place on or through which such cart, vehicle or receptacle may pass.
6. Any person causing or permitting any filth, night soil or other offensive matter to fall or drop from any cart, vehicle or receptacle on to any street, road, lane, alley, passage, thoroughfare or place shall forthwith.
 - (a) remove or cause to be removed such filth, night soil or offensive matter, and
 - (b) clean or cause to be cleaned such street, road, lane, alley, passage, thoroughfare or place to the satisfaction of the Medical Officer of Health.
7. (1) No person shall convey filth, night soil or other offensive matter of any kind in any cart, vehicle or receptacle unless—
 - (a) such cart, vehicle or receptacle is first approved by a Medical Officer of Health, and
 - (b) the person conveying such filth, night soil or other offensive matter first receives a licence so to do from a Medical Officer of Health.

(2) Any approval or licence issued by a Medical Officer of Health in accordance with the provisions of paragraph (1) shall be valid for a period which shall expire on the 31st day of December next after issue, but may be renewed for a like period.

(3) Notwithstanding the provisions of paragraph (2), a Medical Officer of Health may at any time cancel or revoke any licence or approval issued in accordance with paragraph (1) should he consider it in the interest of the public health so to do.

8. (1) No person shall let out, throw or deposit any filth, night soil or other offensive matter into the sea except at such sites and in such manner as the Minister may approve.

(2) Every site approved by the Minister shall be clearly indicated by a signpost or signposts, and such signpost or signposts shall state the hours during which filth, night soil or other offensive matter may be let out, thrown or deposited.

9. No person shall bury any night soil in any place except at such sites and in such manner as the Minister may approve, and unless such night soil is covered by earth to a depth of not less than eighteen inches below the level of the surrounding ground.

10. (1) The owner of any premises which are or are likely to be used—

- (a) as a place of—
 - (i) human habitation; or
 - (ii) habitual employment; or
- (b) by any members of the public as a place of—
 - (i) entertainment; or
 - (ii) refreshment; or
 - (iii) instruction; or
 - (iv) worship

shall to the satisfaction of a Medical Officer of Health—

- (a) provide any such premises with sufficient and suitable sanitary conveniences for the disposal of human excreta, and
- (b) provide any such premises to which the public are or are likely to be admitted or where persons of both sexes are or are likely to be employed or in attendance, with sufficient and suitable separate sanitary conveniences for persons of each sex.

(2) For the purposes of this regulation, a suitable sanitary convenience shall be—

- (a) a properly constructed water closer; or
- (b) a properly constructed pit latrine, or
- (c) a properly constructed earth closet, or
- (d) a properly constructed chemical closet, or
- (e) a properly constructed pail latrine

as may be approved by a Medical Officer of Health

(3) No person shall dispose of sewage from a water closet except by on of the following systems or into one of the following places for which the prior approval of a Medical Officer of Health is required—

- (a) into a properly constructed public or private sewerage system, or
- (b) into a properly constructed suck well or cess pit, or
- (c) into a properly constructed septic tank, or
- (d) into the sea.

-
11. No person shall cause or permit the effluent from any public sewerage system to flow into the sea or on or into any other place except at such sites and in such manner as the Minister may approve.
 12. No person shall cause or permit the effluent from any private sewerage system or from any specific tank to flow into the sea or on or into any other place except at such sites and in such manner as a Medical Officer of Health may approve.
 13. No person shall cause or permit any well, pit, or hole of any description to be used in connection with the disposal of any human or animal excreta or of any filth or of any other offensive matter unless such well, pit or hole shall comply with the provisions of any Act, by-laws, regulations, orders or directions, governing the protection of the underground water supply of Barbados.
 14. The owner or occupier of any premises where an animal dies or is found dead, or the owner of any animal found dead in any public place, shall cause the body of such animal to be promptly removed and disposed of to the satisfaction of a Medical Officer of Health.
 15. If the body of any dead animal sent out to sea is brought by the sea to any place where such body may cause a nuisance or is likely to be detrimental to the public health, the persons responsible for sending the said body to sea shall forthwith cause such body to be removed and disposed of to the satisfaction of the Medical Officer of Health, and such person shall be deemed to have committed a fresh offence every day during which such body has not been removed and disposed of.
 16. If the person responsible for the proper disposal of the body of any dead animal cannot readily be found, or fails satisfactorily to dispose of such dead body within a reasonable time, a Medical Officer of Health shall cause such body to be properly disposed of, but he shall be entitled to recover from the person responsible all expenses reasonably incurred in the hospital thereof.
 17. Any person who brings or causes to be brought on to any beach, whether above or below high water mark, the shells or entrails of sea-eggs shall as soon as is practicable thereafter, dispose of the said shells or entrails by burial to a depth of not less than three feet or in such manner as may be approved by a Medical Officer of Health to avoid injury to any person using the beach and to prevent the breeding of flies or the occurrence of a nuisance.
 18. Any person contravening any of the provisions of these regulations shall be guilty of an offence and on summary conviction thereof shall be liable to a fine not exceeding \$5 000 or imprisonment for a term not exceeding 12 months, or both, and, in the case of a continuing offence, to a further fine not exceeding \$200 for each day or part thereof during which the offence continues after a conviction is first obtained.

APPENDIX II**REVISED POLICY OF PRIVATE SEWAGE AND WASTE WATER DISPOSAL SYSTEM**

Zone I - Areas of prohibited building development around existing and future wells.

- (a) Subject to the provision of Part IV hereunder there shall be no new buildings and no new water connections in this zone.
- (b) Existing buildings shall continue to use existing sewage disposal systems meanwhile and no changes shall be made to such systems except for the purposes of routine maintenance. The Water Board may take such steps to secure changes and improvement in the existing systems as shall be considered to be necessary.
- (c) Subject to the requirements of (b) above, consideration will be given to the grant of permission for minor additions or alterations to existing buildings.

Zone II

- (a) No soakaway pit in this zone shall exceed 20 feet in depth.
- (b) Separate soakaway pits shall be provided for —
 - (i) Sewage; and
 - (ii) Domestic waste water (including bath, kitchen wastes, etc.) However, such water may be run on to the surface where conditions satisfy the Sanitary Authorities.
In case of waterborne sewage a septic tank of approved design must be installed and the effluent from the tank discharged into a soakaway pit.
- (c) Sewage disposal by dry pit shall be permitted.
- (d) No rain or surface waters shall be discharged into a sewage pit.
- (e) All systems to be installed below the 200 feet contour line shall be subject to approval by the Waterworks Department.
- (f) No new petrol or fuel oil installations shall be permitted.
- (g) All sewage disposal works and pits for a new premises or alterations to old premises requiring such works must be certified as a satisfactory construction by the Health Department before the water supply to such premises is connected.

Zone III

- (a) No soakaway pits shall exceed 40 feet in depth.
- (b) In the case of pits without fissure or satisfactory absorption capacity, sewage shall be disposed of by septic tanks or approved design with effluent discharge to soakaway pits. A separate pit must be provided for sewage.
- (c) All domestic waste shall be disposed of to a soakaway pit or septic tank or surface disposal as in Zone II as the case may be.
- (d) Sewage disposal by dry pit shall be permitted.
- (e) No rain or surface waters shall be discharged into a sewage pit.
- (f) Petrol and fuel tanks shall be enclosed in approved leak-proof reservoirs to the satisfaction of the Water Board.
- (g) All sewage disposal works and pits for new premises or alterations to old premises requiring such works must be certified as to satisfactory construction by the Health Department before the water supply to such premises is connected.

Zone IV

- (a) There shall be no special restrictions on the system of waste water and sewage disposal employed.
- (b) Petrol and fuel tanks shall be enclosed in approved leak-proof reservoirs to the satisfaction of the Water Board.

Zone V

- (a) There shall be no special restrictions on the system of waste water and sewage disposal employed.
- (b) No new petrol and fuel tanks shall be constructed in this Zone without the prior approval of the Water Board.

III. INDUSTRIAL WASTES

Zone I - No new industrial waste deposits or disposal shall be permitted. The Water Board may take such steps to secure changes and improvements in existing industrial waste disposal practices as shall be considered to be necessary.

Zone II - V

- (a) All industrial wastes shall be treated in accordance with specifications approved by the Water Board.
- (b) Subject to compliance with (a) above, wells or pits to be used for disposal of industrial wastes in zones II and III shall not exceed the depths specified in Part I above in respect of soakaway pits in the respective zones.
- (c) All industrial waste treatments plans shall be designed, operated and at all times maintained to the satisfaction of the Water Board.

IV. SPECIAL EXEMPTIONS

Special exemption may be authorised by the Water Board.

V. GENERAL

- (i) Subject to the approval of the Water Board sewage and industrial waste may be conveyed by an approved sewerage system from one zone to another to be treated or disposed of in accordance with the appropriate requirements of the zone in which it is to be disposed; or disposed of to the sea.
- (ii) All sewage, waste water and industrial waste disposal systems to be installed in accordance with the above requirements in respect of any zone shall be designed, operated and at all times maintained to the satisfaction of the Local Health Authority.