THE ENVIRONMENTAL PLANNING AND PROTECTION ACT OF 2000

POLLUTION CONTROL AND WASTE MANAGEMENT REGULATIONS

The Minister, in exercise of the powers conferred upon him by Part 4 of the Environmental Planning And Protection Act of 2000, makes the following regulations:

PART 1

Citation and Commencement

1. These regulations may be cited as The Pollution Control And Waste Management Regulations of 2000, and shall come into operation on [date]

Definitiions

2. In these regulations:

"Act" means the Act to Establish the Bahamas Ministry of Environmental Planning and Protection;

"Contaminant or pollutant" means any solid, liquid, gas, odor, heat, sound, vibration, radiation or combination of any of them resulting directly or indirectly from the activities of man which may impair ecosystem functioning; impair the quality of the natural environment for any use that can be made of it; cause injury or damage to property or to plant or animal life; cause harm or discomfort to any person; adversely affect the health or impair the safety of any person; or render any property or plant or animal life unfit for use by man;

"Director" means the Director of the Department of Environmental Protection of The Bahamas Ministry of Environmental Planning and Protection;

"Disposal facility" means a facility or part of a facility at which hazardous waste or solid waste is intentionally placed into or on any land or water, and at which waste will remain after closure;

"Disposal" means any operation specified in Schedule 1 of this regulation;

"Environment" means the natural, manmade, or altered environment of air, land, and water (including the coastal water of the sea) or any combination or part or interacting systems thereof) as defined in the Act;

"Environmentally sound management of hazardous wastes and other wastes, pollutants and contaminants" means taking all practicable steps to ensure that hazardous wastes and other wastes, pollutants and contaminants are managed in a manner that will protect human health and the environment against the adverse effects which may result from such wastes, pollutants and contaminants. The goals of such management are (1) non-degradation of the air quality of The Bahamas; (2) non-degradation of the water quality of The Bahamas and maintaining the quality of the waters of The Bahamas in a

condition suitable for fishing and swimming; and (3) conserving and protecting the physical landscape of The Bahamas;

"Generator" means any person whose activity produces hazardous waste or solid waste, or, if that person is not known, the person who is in possession and/or control of those wastes;

"Hazardous waste" means wastes belonging to any category listed in Schedule 2 of this regulation, unless they do not possess any of the characteristics listed in Schedule 3;

"Hazardous waste management facility" means a site or facility for the collection, transport, storage, treatment, or disposal of hazardous wastes which is permitted by the Director to operate for this purpose;

"Liquid waste" means sewerage and human body wastes and other organic wastes and waste water from toilets and other receptacles intended to receive body wastes; drainage from medical premises, such as hospitals, sick bays, dispensaries, via baths, wash basins and the like fixtures; drainage from places where animals are held, reared, or slaughtered; drainage and waste water from domestic, industrial, commercial, and agricultural operations, including hotels, resorts, marinas, feedlots, and facilities for the manufacture and storage of chemicals; and other waste waters;

"Management" means the collection, transport, and disposal of hazardous waste or solid waste, including after-care of disposal sites;

"Operator" means the person responsible for the overall operation of a hazardous waste or solid waste management facility;

"Other waste" means a liquid waste or a solid waste;

"Owner" means the person who owns all or a part of a hazardous waste or solid waste management facility;

"Person" means any natural or legal person;

"Release" means any spilling, leaking, pumping, pouring, emitting, emptying, discharging, injecting, escaping, leaching, dumping, or disposing into the environment;

"Solid waste" means ashes, garbage, refuse, litter and other discarded solid material resulting from domestic, industrial, commercial and agricultural operations and from community activities but does not include sewage;

"Storage" means the holding of hazardous waste or solid waste for a temporary period, at the end of which the waste is treated, disposed of, or stored elsewhere;

"Transport" means the movement of hazardous waste or solid waste by any and all means, including air, rail, highway, or water;

"Treatment" means any method, technique, or process, including neutralization, designed to change the physical, chemical, or biological character or composition of any hazardous waste so as to neutralize such waste, or so as to recover energy or material resources from the waste, or so as to render such waste non-hazardous, or less hazardous; safer to transport, store, or dispose of; or amenable for recovery, amendable for storage, or reduced in volume;

PART 2

PROHIBITION ON RELEASES

Release Conditions

3. No person shall release into the environment a hazardous waste or other waste, contaminant or pollutant, except under the following conditions:

(1) The release is from a motor vehicle, vessel, or aircraft that has been inspected and found to meet the ambient air emission standards for the vehicle;

(2) The release is a discharge into the ambient air of The Bahamas of sulphur oxides, nitrogen dioxide and oxides of nitrogen, particulate matter, lead, or ozone or other contaminants or pollutants from a facility whose owner or operator has obtained a permit for such discharge from the Director and such discharge is in compliance with the limits established in the permit;

(3) The release is a discharge into the waters of The Bahamas from a facility for the desalinization of water or for the treatment of water containing liquid wastes, contaminants or pollutants from a facility whose owner or operator has obtained a permit for such discharge from the Director and such discharge is in compliance with the limits established in the permit;

(4) The release is a properly treated effluent from a properly sited, designed, operated and maintained septic system;

(5) The release is subject to a temporary waiver issued by the Director.

Absolute Prohibitions

4. The release of the following into the environment is expressly prohibited:

(1) Crankcase oil from motor vehicles or vessels;

(2) Battery acid;

(3) Chlorine;

(4) Other hazardous wastes not listed in (1) through (3);

(5) Ozone depleting substances listed in Schedule 7.

Temporary

5. A temporary waiver from the release prohibition may be issued by the Director

Waivers

for the following:

(1) Releases within the boundaries of a local governmental unit that, at the time the waiver is issued and for a reasonable period thereafter, lacks necessary means, including but not limited to technological facilities, such as sewage collection and treatment systems or solid waste collection and management systems, to treat, control, or eliminate the release or releases within its jurisdiction;

(2) A facility that demonstrates, to the satisfaction of the Director, that it is undertaking steps to eliminate the release or acquire the necessary means to treat or control the release; or

(3) A person that demonstrates, to the satisfaction of the Director, that it has applied for a permit for such release.

PART 3

AMBIENT LIMITS

Water Quality Criteria

6. The following ambient water quality criteria are hereby established for the waters of The Bahamas.

(1) All waters of The Bahamas shall be free of substances attributable to domestic, industrial, or other controllable sources of contaminants or pollutants, including:

(a) Materials that will settle to form objectionable sludge or bottom deposits;

(b) Floating debris, oil, grease, scum, or other floating materials;

(c) Substances in amounts sufficient to produce taste in the water or detectable off-flavor in the flesh of fish, or in amounts sufficient to produce objectionable color, turbidity or other conditions in the receiving waters;

(d) High or low temperatures; biocides; pathogenic organisms; toxic, radioactive, corrosive, or other deleterious substances at levels or in combinations sufficient to be toxic or harmful to human, animal, plant, or aquatic life, or in amounts sufficient to interfere with any beneficial use of the water;

(e) Substances or conditions or combinations thereof in concentrations which produce undesirable aquatic life;

(f) Soil particles resulting from erosion on land involved in earthwork, such as the construction of public works; highways; subdivisions; recreational, commercial, or industrial developments; or the cultivation and management of agricultural lands.

(2) To ensure compliance with paragraph (1), all waters of The Bahamas are subject to monitoring and to the following standards for acute and chronic toxicity to aquatic organisms and the protection of human health.

(a) As used in this section:

(i) "Acute Toxicity" means the degree to which a pollutant, discharge, or water sample causes a rapid adverse impact to aquatic organisms. The acute toxicity of a discharge or receiving water is measured using the methods in Schedule 4, unless other methods are specified by the Director.

(ii) "Chronic Toxicity" means the degree to which a pollutant, discharge, or water sample causes a long-term adverse impact to aquatic organisms, such as a reduction in growth or reproduction. The chronic toxicity of a discharge or receiving water is measured using the methods in Schedule 4, unless other methods are specified by the Director.

(iii) "Dilution" means, for discharges through submerged outfalls, the average and minimum values calculated using the models listed in Schedule 4.

(iv) "No Observed Effect Concentration" (NOEC) means the highest per cent concentration of a discharge or water sample, in dilution water, which causes no observable adverse effect in a chronic toxicity test. For example, an NOEC of 100 percent indicates that an undiluted discharge or water sample causes no observable adverse effect to the organisms in a chronic toxicity test.

(b) The numeric standards for toxic pollutants in this section are applicable to all waters. The numeric standards for toxic pollutants are provided in Schedule 5. The freshwater standards apply where the dissolved inorganic ion concentration is less than 0.5 parts per thousand; saltwater standards apply above 0.5 parts per thousand.

(i) Acute Toxicity Standards for the Protection of Aquatic Life: All waters shall be free from pollutants in concentrations which exceed the acute standards listed in Schedule 5. All waters of The Bahamas shall also be free from acute toxicity as measured using the toxicity tests listed in Schedule 4, or other methods specified by the Director.

(ii) Chronic Toxicity Standards for the Protection of Aquatic Life: All waters shall be free from pollutants in concentrations which on average during any 24-hour period exceed the chronic standards listed in Schedule 5. All waters of the Bahamas shall also be free from chronic toxicity as measured using the

toxicity tests listed in Schedule 4, or other methods specified by the Director.

(iii) Human Health Standards: All waters of The Bahamas shall be free from pollutants in concentrations which, on average during any 30-day period, exceed the "fish consumption" standards for non-carcinogens in Schedule 5. All waters shall also be free from pollutants in concentrations, which on average during any 12-month period, exceed the "fish consumption" standards for pollutants identified as carcinogens in Schedule 5.

(c) The following are basic requirements applicable to discharges to waters of The Bahamas. These standards shall be enforced through effluent limitations or other conditions in water quality discharge permits. The Director may apply more stringent discharge requirements to any discharge if necessary to ensure compliance with all standards in paragraph (2)(b).

(i) Continuous discharges through submerged outfalls. The No Observed Effect Concentration (NOEC), expressed as percent effluent, of continuous discharges through submerged outfalls shall not be less than 100 divided by the minimum dilution. In addition, such discharges shall not contain:

(A) Pollutants in 24-hour average concentrations greater than the values obtained by multiplying the minimum dilution (as calculated using the methods in Schedule 4) by the standards in Schedule 5 for the prevention of chronic toxicity.

(B) Non-carcinogenic pollutants in 30-day average concentrations greater than the values obtained by multiplying the minimum dilution (as calculated using the methods in Schedule 4) by the standards in Schedule 5 for fish consumption.

(C) Carcinogenic pollutants in 12-month average concentrations greater than the values obtained by multiplying the average dilution (as calculated using the

methods in Schedule 4) by the standards in Schedule 5 for fish consumption.

(ii) Discharges without submerged outfalls. The survival of test organisms in an undiluted acute toxicity test of any discharge shall not be less than 80 percent. In addition, no such discharge shall contain pollutants in concentrations greater than the standards in Schedule 5 for the prevention of acute toxicity to aquatic life**.** The Director may make a limited allowance for dilution for a discharge in this category if it meets the

following criteria: the discharge velocity is greater than 3 meters per second; the discharge enters the receiving water horizontally, and the receiving water depth at the discharge point is greater than zero.

(3) The requirements of paragraph (1)(f) shall be deemed met upon a showing that the land on which the erosion occurred or is occurring is being managed in accordance with soil conservation practices acceptable to the Director, and that a comprehensive conservation program is being actively pursued, or that the discharge has received the best degree of treatment or control, and that the severity of impact of the residual soil reaching the receiving body of water is deemed to be acceptable.

(4) In order to reduce a risk to public health or safety arising out of any violation or probable violation of this chapter, the Director may post or order posted any waters of The Bahamas. Posting is the placement, erection, or use of a sign or signs warning people to stay out of, avoid drinking, avoid contact with, or avoid using the water. This posting authority shall not limit the Director's authority to post or order posting in any other appropriate case or to take any enforcement action.

Air Quality Criteria

7. The following air quality criteria are hereby established for the ambient air of The Bahamas.

(1) The ambient air of The Bahamas shall be free of concentrations of contaminants or pollutants that are or could be harmful to human health or the environment as a whole

(2) To ensure compliance with paragraph (1), the ambient air of The Bahamas is subject to monitoring. The limit values in Schedule 7 shall be enforced through release limitations or other conditions in air quality discharge permits.

(3) As used in this section:

(i) “ambient air” means outdoor air in the troposphere, excluding work places;

(ii) “atmospheric contaminants or pollutants” means sulphur dioxide, nitrogen dioxide and oxides of nitrogen, particulate matter, lead, and ozone or any other substance introduced directly or indirectly by man into the ambient air and likely to have harmful effects on human health and/or the environment as a whole;

(iii) “level” means the concentration of a pollutant in ambient air or the deposition thereof on surfaces in a given time;

(iv) “assessment” means any method used to measure, calculate, predict, or estimate the level of a pollutant in the ambient air;

(v) "limit value" means a level fixed on the basis of scientific knowledge with the aim of avoiding, preventing, or reducing harmful effects on human health and/or the environment as a whole, to be attained within a given period and not to be exceeded once attained;

(vi) "oxides of nitrogen" means the sum of nitric oxide and nitrogen dioxide added as parts per billion and expressed as nitrogen, dioxide in micrograms per cubic meter;

(vii) "particulate matter" means particulate matter which passes through a size-selective inlet with a 50% efficiency cut-off at 10 µm aerodynamic diameter (PM_{10}) and particulate matter which passes through a size-selective inlet with a 50% efficiency cut-off at 2,5 µm aerodynamic diameter (PM_{25}).

PART 4

PERMITTING

Water Quality Discharge Permit

8. The Director shall consider applications for a water quality discharge permit to release liquid waste, contaminants or pollutants into the waters of The Bahamas as part of the Environmental Impact Assessment process. The Water Quality Discharge Permit shall be issued as a component of the Environmental Permit to Operate. An application for a permit shall be submitted to the Director in a form acceptable to the Director. An application shall consist at a minimum of the following:

(1) The name, mailing address, and location of the facility;

(2) The name and mailing address of the owner of the facility and the name and mailing address of the operator of the facility, if different;

(3) A description of the facility, including all activities or processes that generate liquid waste, contaminants or pollutants; and a description of each such waste, contaminant or pollutant generated with an estimate of the annual quantity of each that is released into the waters of The Bahamas;

(4) A description of the location of all points from which liquid waste, contaminants or pollutants are released from the facility into the waters of The Bahamas;

(5) A description of the waters of The Bahamas into which the liquid waste, contaminant or pollutant is released;

(6) The results of analyses conducted by the permit applicant demonstrating that the ambient limits established under Section 6 will be met by the permitted release. The Director may require, as support for these analyses, the results of any or all of the following:

(i) Water quality surveys, including dilution studies, chemical-specific

receiving water quality analyses, receiving stream influent analyses; and

(ii) Effluent dispersion models, dispersion models, and flow models;

(iii) Bio-surveys, including receiving stream benthic organism evaluations, studies of the presence/absence of certain species, ecosystem evaluations, studies of the proliferation of certain organisms, and bioaccumulation studies;

(iv) Toxicity reduction evaluations;

(v) Sediment studies, including sediment deposition measurements, sediment dispersal characterizations, and chemical-specific sediment analyses;

(vi) Storm water pollution management studies and storm water pollution prevention plans;

(vii) Monitoring plans.

Air Quality Discharge Permit

9. The Director shall consider applications for an air quality discharge permit to release contaminants or pollutants into the ambient air of The Bahamas as part of the Environmental Impact Assessment process. The Air Quality Discharge Permit shall be issued as a component of the Environmental Permit to Operate. An application for a permit shall be submitted to the Director in a form acceptable to the Director. An application shall consist at a minimum of the following:

(1) The name, mailing address, and location of the facility;

(2) The name and mailing address of the owner of the facility and the name and mailing address of the operator of the facility, if different;

(3) A description of the facility, including all activities or processes that generate contaminants or pollutants; and a description of each such

contaminant or pollutant generated with an estimate of the annual quantity of each that is released into the ambient air of The Bahamas;

(4) A description of the location of all points from which contaminants or pollutants are released from the facility into the ambient air of The Bahamas;

(5) The results of analyses conducted by the permit applicant demonstrating that the ambient limits established under Section 7 will be met by the permitted release. The Director may require, as support for these analyses, the results of any or all of the following:

(i) Air quality surveys, including, chemical-specific and location-specific ambient air quality analyses and dispersion modeling

studies;

(ii) Plume rise dispersion and deposition models;

(iii) Bio-surveys, including human health studies, ecosystem evaluations, studies of the proliferation of certain organisms, and bioaccumulation studies;

(iv) Toxicity reduction evaluations;

(v) Monitoring plans;

(vi) Other studies required by the Director to support a decision on the application.

Hazardous Waste Management Permit and Identification Number Required

10. No person shall:

(1) generate hazardous waste and store, treat, dispose of, or release such hazardous waste on the site where it is generated,

(2) transfer hazardous waste to another person for transport from the site where it is generated,

(3) accept hazardous waste from a generator for transport, treatment, storage, or disposal of such hazardous waste,

(4) operate a hazardous waste storage, treatment, or disposal facility,

(5) transport hazardous waste within The Bahamas,

(6) import hazardous waste into The Bahamas, or

(7) export hazardous waste from The Bahamas

unless that person has obtained a hazardous waste management permit and hazardous waste identification number from the Director.

Application for Hazardous Waste Management Permit and Identification Number

11. The Director shall consider applications for a hazardous waste management permit as part of The Environmental Impact Assessment process. The Hazardous Waste Management Permit shall be issued as a component of The Environmental Permit to Operate. An application for a hazardous waste management permit shall be submitted to the Director in a form acceptable to the Director. An application shall contain the following:

(1) The name, mailing address, and location of the hazardous waste management facility;

(2) The name and mailing address of the owner of the facility and the name and mailing address of the operator, if different;

(3) A description of the facility, including all activities or processes used to store, treat, or dispose of hazardous waste;

(4) A description of each hazardous waste generated, stored, treated, or disposed of at the facility;

(5) An estimate of the annual quantity of each hazardous waste generated, stored, treated, or disposed of at the facility; and

(6) A plan for the environmentally sound management of waste, demonstrating to the maximum extent technically feasible how the waste will be permanently isolated and how the location, construction, monitoring, operating, and closure/post-closure standards of Part 7 will be met.

Financial Assurance Required

12. No person shall be granted a permit for the transport, storage, treatment, or disposal of hazardous waste unless that person has demonstrated, by means of a surety, insurance, or other form of financial assurance in an amount acceptable to the Director, that the person can clean up and close the hazardous waste management facility and pay reasonably foreseeable claims for bodily injury or property damage caused by releases from transport or from the facility.

Monitoring Plan Required

13. No person shall be granted a permit for the transport, storage, treatment, or disposal of hazardous waste unless that person has demonstrated, by means of a monitoring plan acceptable to the Director, that the person has in place a system for detecting releases of hazardous wastes or hazardous waste constituents from the facility to the environment that could threaten human health or the environment.

Contingency Plan Required

14. No person shall be granted a permit for the transport, storage, treatment, or disposal of hazardous waste unless that person has demonstrated, by means of a contingency plan acceptable to the Director, that the person has an organized, planned, and coordinated course of action to be followed in case of a fire, explosion, or release

of hazardous waste or hazardous waste constituents which could threaten human health or the environment.

PART 5

PACKAGING AND LABELING

Packaging and Labeling Standards

15. No person shall store or transport hazardous waste that is not packaged and labeled in conformity with the standards in Schedule X.

Container Marking

16. Before transporting or offering hazardous waste for transportation, the generator must mark each container with the following words and information:

HAZARDOUS WASTE. Improper disposal is prohibited. If found, notify the nearest police or public safety official or the Director.
Generator's name and address:

PART 6

MOVEMENT DOCUMENTS

Contents of Movement Document

17. A generator of hazardous waste that transports such waste, or offers such waste for transport, must prepare a movement document, which may be in a format specified by the Director, that contains the following information:

(1) The name, address, telephone number, and hazardous waste permit number of the generator;

(2) The name, address, telephone number, and hazardous waste permit number of the transporter;

(3) The name, address, telephone number, and hazardous waste permit number of the facility to which the hazardous waste is being transported;

(4) A description of each hazardous waste, including a description of each type of waste, the amount of each type of waste, the type of container containing each type of waste, and special handling requirements, if any, for each type of waste;

Copies of Movement Document

18. The movement document shall consist of the number of copies necessary to provide the generator, each transporter, and the owner or operator of the facility to which the hazardous waste is being transported with one copy each for their records, another copy to be returned to the generator, and a copy to be delivered to the Director.

Signature of Generator

19. The movement document shall be signed by the generator, who shall retain a copy of the signed document available for inspection for five years. The generator shall also retain the copy of the movement document returned to the generator by the facility to which the hazardous waste is being transported available for inspection for five years.

Signatures of Transporters

20. The movement document shall be signed by the initial transporter, and by each subsequent transporter, as acknowledgement of the receipt of the materials. The transporter shall retain a copy of the signed document available for inspection for five years;

Signature of Facility Owner or Operator

21. The movement document shall be signed by the owner or operator of the facility to which the hazardous waste is being transported. The owner or operator shall retain a copy of the signed document available for inspection at the facility for five years. The owner or operator also shall send one copy of the movement document containing the signatures of the generator, each transporter, and the owner or operator of the facility to the generator and one copy to the Director.

PART 7

STANDARDS FOR STORAGE, TREATMENT, AND DISPOSAL FACILITIES FOR SOLID AND HAZARDOUS WASTES

Location, Construction,

22. The Director shall establish as conditions of licenses for solid or hazardous

Monitoring, Operating, and Closure/Post Closure Care Requirements

waste storage, treatment, or disposal facilities those standards that, in the opinion of the Director, are reasonable and necessary insofar as is technically feasible to permanently isolate the waste and to protect human health and the environment from waste at the facility. Such standards must include:

(1) Location requirements. The Director shall prohibit the location of new solid or hazardous waste management facilities in areas of human or environmental sensitivity or vulnerability and set limits on the proximity of such facilities to natural or cultural resources. The Director may require such facilities currently located in areas of human or environmental sensitivity or in proximity to natural or cultural resources to cease and desist operations and conduct cleanup operations.

(2) Construction requirements. The Director shall specify as license conditions such standards for the construction of new solid or hazardous waste management facilities as in the opinion of the Director are necessary to isolate the waste and to protect human health and the environment. The Director may require such facilities currently in operation to conduct such backfit as the Director deems necessary to protect human health and the environment from wastes at the facility.

(3) Monitoring requirements. The Director shall specify as license conditions such standards for ambient air, water, and soil monitoring by the owner or operator of the facility that in the opinion of the Director are necessary to ensure that releases to the environment from the facility that are capable of posing a threat to human health or the environment are detected.

(4) Operating requirements. The Director shall specify as license conditions such standards for the operation of a solid or hazardous waste management facility that in the opinion of the Director are necessary to ensure that operation of the facility does not pose a threat to human health or the environment.

(5) Closure and post-closure care requirements. The Director shall specify as license conditions such standards for closure and post-closure care of the facility that in the opinion of the Director are necessary to ensure that following closure of the facility any solid or hazardous waste remaining at the site will not pose a threat to human health or the environment.

Schedule 1

DISPOSAL OPERATIONS

A. OPERATIONS WHICH DO NOT LEAD TO THE POSSIBILITY OF RESOURCE RECOVERY, RECYCLING, RECLAMATION, DIRECT RE-USE OR ALTERNATIVE USES

(1) Deposit into or onto land, (e.g., landfill, etc.)

(2) Land treatment, (e.g., biodegradation of liquid or sludgy discards in soils, etc.)

(3) Deep injection, (e.g., injection of pumpable discards into wells, salt domes of naturally occurring repositories, etc.)

(4) Surface impoundment, (e.g., placement of liquid or sludge discards into pits, ponds or lagoons, etc.)

(5) Specially engineered landfill, (e.g., placement into lined discrete cells which are capped and isolated from one another and the environment, etc.)

(6) Release into a water body except seas/oceans

(7) Release into seas/oceans including sea-bed insertion

(8) Biological treatment not specified elsewhere in this Schedule which results in final compounds or mixtures which are discarded by means of any of the operations in Section A

(9) Physico chemical treatment not specified elsewhere in this Schedule which results in final compounds or mixtures which are discarded by means of any of the operations in Section A, (e.g., evaporation, drying, calcination, neutralization, precipitation, etc.)

(10) Incineration on land

(11) Incineration at sea

(12) Permanent storage (e.g., emplacement of containers in a mine, etc.)

(13) Blending or mixing prior to submission to any of the operations in Section A

(14) Repackaging prior to submission to any of the operations in Section A

(15) Storage pending any of the operations in Section A

B. OPERATIONS WHICH MAY LEAD TO RESOURCE RECOVERY, RECYCLING RECLAMATION, DIRECT RE-USE OR ALTERNATIVE USES

Section B encompasses all such operations with respect to materials legally defined as or considered to be hazardous wastes and which otherwise would have been destined for operations included in Section A

(1) Use as a fuel (other than in direct incineration) or other means to generate energy

(2) Solvent reclamation/regeneration

(3) Recycling/reclamation of organic substances which are not used as solvents

(4) Recycling/reclamation of metals and metal compounds

(5) Recycling/reclamation of other inorganic materials

(6) Regeneration of acids or bases

(7) Recovery of components used for pollution abatement

(8) Recovery of components from catalysts

(9) Used oil re-refining or other reuses of previously used oil

(10) Land treatment resulting in benefit to agriculture or ecological improvement

(11) Uses of residual materials obtained from any of the operations numbered A1-A10

(12) Exchange of wastes for submission to any of the operations numbered A1-A11

(13) Accumulation of material intended for any operation in Section B

Source: Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal

Schedule 2

CATEGORIES OF HAZARDOUS WASTES

Waste Streams

-- Clinical wastes from medical care in hospitals, medical centers and clinics

-- Wastes from the production and preparation of pharmaceutical products

-- Waste pharmaceuticals, drugs and medicines

-- Wastes from the production, formulation and use of biocides and phytopharmaceuticals

-- Wastes from the manufacture, formulation and use of wood preserving chemicals

-- Wastes from the production, formulation and use of organic solvents

-- Wastes from heat treatment and tempering operations containing cyanides

-- Waste mineral oils unfit for their originally intended use

-- Waste oils/water, hydrocarbons/water mixtures, emulsions

-- Waste substances and articles containing or contaminated with polychlorinated biphenyls (PCBs) and/or polychlorinated terphenyls (PCTs) and/or polybrominated biphenyls (PBBs)

-- Waste tarry residues arising from refining, distillation and any pyrolytic treatment

-- Wastes from production, formulation and use of inks, dyes, pigments, paints, lacquers, varnish

-- Wastes from production, formulation and use of resins, latex, plasticizers, glues/adhesives

-- Waste chemical substances arising from research and development or teaching activities which are not identified and/or are new and whose effects on man and/or the environment are not known

-- Wastes of an explosive nature not subject to other legislation

-- Wastes from production, formulation and use of photographic chemicals and processing materials

-- Wastes resulting from surface treatment of metals and plastics

-- Residues arising from industrial waste disposal operations

Wastes having as constituents:

-- Metal carbonyls

-- Beryllium; beryllium compounds

-- Hexavalent chromium compounds

-- Copper compounds

-- Zinc compounds

-- Arsenic; arsenic compounds

-- Selenium; selenium compounds

-- Cadmium; cadmium compounds

-- Antimony; antimony compounds

-- Tellurium; tellurium compounds

-- Mercury; mercury compounds

-- Thallium; thallium compounds

-- Lead; lead compounds

-- Inorganic fluorine compounds excluding calcium fluoride

-- Inorganic cyanides

-- Acidic solutions or acids in solid form

-- Basic solutions or bases in solid form

-- Asbestos (dust and fibres)

-- Organic phosphorus compounds

-- Organic cyanides

-- Phenols; phenol compounds including chlorophenols

-- Ethers

-- Halogenated organic solvents

-- Organic solvents excluding halogenated solvents

-- Any congenor of polychlorinated dibenzo-furan

-- Any congenor of polychlorinated dibenzo-p-dioxin

-- Organohalogen compounds other than substances referred to in this Schedule

Source: Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal

Schedule 3

HAZARDOUS CHARACTERISTICS

UN Class Code Characteristics

1 H1 Explosive

An explosive substance or waste is a solid or liquid substance or waste (or mixture of substances or wastes) which is in itself capable by chemical reaction of producing gas at such a temperature and pressure and at such speed as to cause damage to the surroundings.

3 H3 Flammable liquids

The word "flammable" has the same meaning as "inflammable." Flammable liquids are liquids, or mixtures of liquids, or liquids containing solids in solution or suspension (for example, paints, varnishes, lacquers, etc., but not including substances or wastes otherwise classified on account of their dangerous characteristics) which give off a flammable vapour at temperatures of not more than 60.5 C, closed-cup test, or not more than 65.6C, open-cup test. (Since the results of open-cup tests and of closed-cup tests are not strictly comparable and even individual results by the same test are often variable, regulations varying from the above figures to make allowance for such differences would be within the spirit of this definition.)

4.1 H4.1 Flammable solids

Solids, or waste solids, other than those classed as explosives, which under conditions encountered in transport are readily combustible, or may cause or contribute to fire through friction.

4.2 H4.2 Substances or wastes liable to spontaneous combustion

Substances or wastes which are liable to spontaneous heating under normal conditions encountered in transport, or to heating up on contact with air, and being then liable to catch fire.

4.3 H4.3 Substances or wastes which, in contact with water emit flammable gases

Substances or wastes which, by interaction with water, are liable to become spontaneously flammable or to give off flammable gases in dangerous quantities.

5.1 H5.1 Oxidizing

Substances or wastes which, while in themselves not necessarily combustible, may, generally by yielding oxygen cause, or contribute to, the combustion of other materials.

5.2 H5.2 Organic Peroxides

Organic substances or wastes which contain the bivalent-O-O- structure are thermally unstable substances which may undergo exothermic self-accelerating decomposition.

6.1 H6.1 Poisonous (Acute)

Substances or wastes liable either to cause death or serious injury or to harm health if swallowed or inhaled or by skin contact.

6.2 H6.2 Infectious substances

Substances or wastes containing viable micro organisms or their toxins which are known or suspected to cause disease in animals or humans.

8 H8 Corrosives

Substances or wastes which, by chemical action, will cause severe damage when in contact with living tissue, or, in the case of leakage, will materially damage, or even destroy, other goods or the means of transport; they may also cause other hazards.

9 H10 Liberation of toxic gases in contact with air or water

Substances or wastes which, by interaction with air or water, are liable to give off toxic gases in dangerous quantities.

9 H11 Toxic (Delayed or chronic)

Substances or wastes which, if they are inhaled or ingested or if they penetrate the skin, may involve delayed or chronic effects, including carcinogenicity.

9 H12 Ecotoxic

Substances or wastes which if released present or may present immediate or delayed adverse impacts to the environment by means of bioaccumulation and/or toxic effects upon biotic systems.

9 H13 Capable, by any means, after disposal, of yielding another material, e.g., leachate, which possesses any of the characteristics listed above.

Source: Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal

Schedule 4

WATER QUALITY ANALYTIC METHODS

(1) Laboratory analysis shall be performed by a laboratory approved by the Ministry of Environmental Planning and Protection of The Bahamas.

(2) For effluent toxicity testing for fresh receiving waters, a minimum of three species should be tested including one fish, one invertebrate, and one algal species. Preferred test species for freshwater outfalls are a warmwater fish (e.g., zebra fish), a Daphnid species, and a unicellular green algae or diatom. Preferred test species for saltwater outfalls include a minnow, killifish, or stickleback; a copepod, mysid, shrimp, or crab; a polychaete worm or a mollusc (e.g., gastropod or bivalve embryo/larval test); a diatom species; and the sea urchin sperm cell test.

(3) Where applicable, analysis to determine compliance with rules shall be by the methods in Table 4-1.

Table 4-1. Water Quality Analyses for The Bahamas

Parameter	References
Sample collection for phytoplankton and other bioassays	American Public Health Association (APHA), American Water Works Association (AWWA), and Water Pollution Control Federation (WPCF). Standard Methods for the Examination of Water and Waste Water, 20th Edition. American Public Health Association, Washington, DC.
Sample preservation and holding time and chemical methodology for saltwater samples	Parsons, T.R., Y. Maita, and C.M. Lalli. 1984. *A Manual of Chemical and Biological Methods for Seawater Analysis.* New York, NY: Pergamon Press. Grashof, K., M. Erhardt, and K. Kremling (eds.). 1983. *Methods of Seawater Analysis*, 2nd Revised and Extended Edition. Weinheim, Germany: Verlag Chemie.
Acute and chronic toxicity for aquatic organisms in freshwater, estuarine, and saltwater ecosystems. (Guidelines for warmwater and tropical species only.)	Rand, G.M. (Ed.). 1995. Fundamentals of Aquatic Toxicology: Effects, Environmental Fate, and Risk Assessment. Second Edition. Taylor & Francis, Washington, DC. USA, and London, WC1N 2ET, England. Ecological Effects Test Guidelines, USEPA Office of Prevention, Pesticides, and Toxic Substances (OPPTS), draft harmonized guidelines with the Organization for Economic Cooperation and Development (OECD) (www.epa.gov/docs/ OPPTS_ Harmonized/850_Ecological_Effects _Test_Guidelines/ Drafts) American Society for Testing and Materials (ASTM): See references listed in Rand (1995)

Parameter	References
	Organization for Economic Cooperation and Development (OECD). 1987. Guidelines for Testing of Chemicals. Paris, France.
Expected Dilution in mixing zone for discharges through submerged outfalls, the average and minimum values calculated using the models listed in	USEPA. 1985. *Initial Mixing Characteristics of Municipal Ocean Discharges* (EPA 600-3-85-073, November). USEPA. 1990. *Expert System for Hydrodynamic Mixing Zone Analysis of Conventional and Toxic Submerged Single Port Discharges* (Cormix 1)(EPA 600-3-90-073, February).
Bacteria	USEPA. 1986. *Test Methods for Escherichia coli and Enterococci in Water by the Membrane Filter Procedure* (EPA-600-4-85-076). USEPA. 1997. *Method 1600: Membrane Filter Test Method for Enterococci in Water* (EPA-821-R-97-004, May). USEPA. 2000. *Improved Enumeration Methods for the Recreational Water Quality Indicators: Enterococci and Escherichia coli* (EPA-821-R-97-004).

For saltwater fish, recommended test species for analyses conducted outside of The Bahamas include the Atlantic silverside (*Menidia menidia*), sheepshead minnow (*Cyprinodon variegatus*), and the tidewater silverside (*Menidia penisulae*). For studies conducted in The Bahamas, native fish species that survive well in the laboratory can be used.

For freshwater fish, recommended test species for analyses conducted outside of The Bahamas include the bluegill sunfish (*Lepomis macrochirus*), channel catfish *(Ictalurus punctatus*), common carp (*Cyprinus carpio*), fathead minnow (*Pimephales promelas*), guppy (*Poecilia reticulata*), red killifish (*Oryzias latipes*), and zebra fish (*Brachydanio rerio*). For studies conducted in The Bahamas, native fish species that survive well in the laboratory can be used.

Schedule 5

AMBIENT WATER QUALITY STANDARDS FOR CHEMICAL POLLUTANTS

Interim values for numerical standards are presented in Section A of this Schedule. The procedures used to derive the standards for the protection of the aquatic life of The Bahamas indicate that, except possibly where a locally important species is very sensitive, aquatic organisms should not be affected unacceptably if the four-day average concentration of the contaminant does not exceed the acute standard more than once every three years on average and if the one-hour average concentration does not exceed the chronic standard more than once every three years on the average.

For naturally occurring compounds and elements, the final water quality standards should not be lower than the natural background concentrations of the compounds or elements in the waters of The Bahamas.

The freshwater standards apply where the dissolved inorganic ion concentration is less than 0.5 parts per thousand; saltwater standards apply above 0.5 parts per thousand. Values for metals refer to the dissolved fraction unless noted otherwise. All values are expressed in micrograms per liter (μg/L).

Interim standards for bacteria in water are provided in Section B of this Schedule..

Additional narrative water quality standards are provided in Section C of this Schedule..

A. Numerical Standards

CAS Number	Pollutant (footnote)	Water Quality Standards for Waters of the Bahamas (µg/L)					
		For the Protection of Human Health		For the Protection of Aquatic Life			
		Drinking & Fish Consumption (freshwater) **	Fish Con-sumption Only (saltwater) **	For the Protection of Freshwater Aquatic Life		For the Protection of Saltwater Aquatic Life	
				Acute	Chronic	Acute	Chronic
Inorganic Compounds							
7440382	Arsenic (1)	0.018 [(a)] #	0.14 [(a)] #	340 [(a)]	150 [(a,b)]	69 [(a,b)]	36 [(a,b)]
7440439	Cadmium (2)			4.3 [(a)] +	2.2 [(a)] +	42 [(a,b)]	9.3 [(a,b,c)]
7782505	Chlorine [(3)]			19 [(a,b)]	11 [(a,b)]	13 [(a,b)]	7.5 [(a,b)]
16065831	Chromium III (4)			570 [(a)] +	74 [(a)] +		
18540299	Chromium VI (5)			16 [(a,b)]	11 [(a,b)]	1100 [(a,b)]	50 [(a,b)]
7440508	Copper (6)	1300 [(a)]		13 [(a)] +	9 [(a)] +	4.8 [(a)]	3.1 [(a)]
7439921	Iron (7)				1000 [(a)]		
7439921	Lead (8)			29 [(b)] +	2.5 [(a)] +	140 [(b)]	5.6 [(b)]
7439976	Mercury (9)	0.002 [(a,b-mod)]	0.002 [(a,b-mod)]	2.4 [(b)]	0.55 [(b)]	2.1 [(b)]	0.025 [(b)]

CAS Number	Pollutant (footnote)	Water Quality Standards for Waters of the Bahamas (µg/L)					
		For the Protection of Human Health		For the Protection of Aquatic Life			
		Drinking & Fish Consumption (freshwater) **	Fish Consumption Only (saltwater) **	For the Protection of Freshwater Aquatic Life		For the Protection of Saltwater Aquatic Life	
				Acute	Chronic	Acute	Chronic
7440020	Nickel (10)	190 (a-mod)	260 (a-mod)	5 (b) +	5 (b) +	75 (a,b) #	8.3 (a,b,c) #
1336363	Phosphorous (11)				0.1 (a,c)		0.1 (c)
7782492	Selenium (12)	30 (a-mod)	40 (a-mod)	20 (b)	5 (a,b,c)	290 (a)	71 (a,b,c)
7440224	Silver (13)			1 (b) +	1 (b)	2.3 (b)	1 (b)
7440666	Zinc (14)	1000 (a-mod)	1200 (a-mod)	22 (b) +	22 (b) +	95 (b)	86 (b)
Organic Compounds							
309002	Aldrin (15)	0.00013 (a) #	0.00014 (a) #	3.0 (a,b,c)	1.3 (c)	1.3 (a,b,c)	1.3 (c)
57125	Cyanide (16)			22 (a)	5.2 (a)	1.0 (a)	1.0 (a)
7723140	PCBs (17)	0.00017 (a) #	0.00017 (a) #	0.002 (a,b)	0.014 (a,b,c)		0.03 (a,b,c)
57749	Chlordane (18)	0.0021 (a) #	0.0022 (a) #	2.4 (a,b)	0.0043 (a,b)	0.09 (a,b)	0.004 (a,b)
50293	DDT (19)	0.00059 (a) #	0.00059 (a) #	1.1 (a,b)	0.001 (a,b)	0.13 (a,b)	0.001 (a,b,c)

CAS Number	Pollutant (footnote)	Water Quality Standards for Waters of the Bahamas (µg/L)					
		For the Protection of Human Health		For the Protection of Aquatic Life			
		Drinking & Fish Consumption (freshwater) **	Fish Con-sumption Only (saltwater) **	For the Protection of Freshwater Aquatic Life		For the Protection of Saltwater Aquatic Life	
				Acute	Chronic	Acute	Chronic
959988	Endosulfan (20)	110 [(a)]	240 [(a)]	0.22 [(b,c)]	0.056 [(b,c)]	0.034 [(b,c)]	0.0087 [(b,c)]
72208	Endrin (21)	0.076 [(a)]	0.081 [(a)]	0.086 [(a)]	0.036 [(a)]	0.037 [(a,b)]	0.0023 [(a,b,c)]
121755	Malathion				0.1 [(a,b,c)]		0.1 [(a,b,c)]
72435	Methoxychlor				0.3 [(a,b,c)]		0.3 [(a,b,c)]
2385855	Mirex				0.001 [(a,b,c)]		0.001 [(a,b,c)]
56382	Parathion (22)			0.065 [(a,b)]	0.013 [(a,b)]		
8001352	Toxaphene (23)	0.00073 [(a)] #	0.00075 [(a)] #	0.73 [(a,b)]	0.0002 [(a,b,c)]	0.21[(a,b)]	0.0002 [(a,b,c)]

Sources:

In deriving these initial interim water quality standards for the protection of human health and for the protection of aquatic organisms in fresh and saltwater, water quality criteria and standards developed by the United States Environmental Protection Agency (USEPA), the States of Hawaii and Florida in the US, and the US Territory of Puerto Rico were considered. In general, the value selected as the interim water quality standard for The Bahamas represents the lowest of the values established by the USEPA or Hawaii. Freshwater sources on islands are more limited than in the coterminous United States; thus, lower water quality standards are needed for some contaminants to protect the limited freshwater sources. Where the values for the USEPA and Hawaii were the same, that is so indicated by (a,b) after the standard in Section A. When the value also matched that of the State of Florida or Puerto Rico, that is so indicated by (c) or (d).

(a) USEPA (U.S. Environmental Protection Agency). 1999. *National Recommended Water Quality Criteria -- Correction.* Office of Water, Washington, DC. EPA 822-Z-99-001. April.

(a-mod) Values from USEPA 1999 modified to assume a daily fish ingestion rate of 114 grams per day.

(b) Hawaii, US State: Title 11, Chapter 54, Hawaii. April 17, 2000. Section 11-54-04 Basic Water Quality Criteria Applicable to All Waters (Integrated).

(c) Florida, US State: Title 62, Chapter 62-302, Florida. December 26, 1996. Section 62-302.300 Findings, Intent and Antidegradation Policy for Surface Water Quality (Integrated).

(d) Puerto Rico, US Territory: Environmental Quality Board, Water Quality Standards Regulation, Puerto Rico. September 27, 1990. Section Article 3: Water Quality Standards and Use Classifications to be Protected in the Waters of Puerto Rico (Integrated).

(e) USEPA (U.S. Environmental Protection Agency). 1976. *Quality Criteria for Water*. Washington, DC.

Abbreviations:

ns -- No standard has been developed.

+ -- The value listed is the minimum standard. Depending upon the receiving water calcium carbonate ($CaCO_3$) hardness, higher standards can be calculated using the respective formula in the footnotes.

** Interim value; does not account for potential bioaccumulation in aquatic food webs or for the quantity of fish and shellfish consumed daily by the people of The Bahamas.

# Indicates that the chemical is a carcinogen, likely carcinogen, or possible carcinogen via oral exposures according to the U.S. Environmental Protection Agency. Standard based on a one-in-one-million risk of cancer (i.e., 10^{-6}). See Schedule 6.

Notes:

Note -- Compounds listed in the plural in the "Pollutant" column represent complex mixtures of isomers. Numbers listed to the right of these compounds refer to the total allowable concentration of any combination of isomers of the compound, not only to concentrations of individual isomer.

(1) The water quality standards are based on total dissolved inorganic arsenic in the water column. *The interim standards for the protection of human health should be modified to reflect the most recent estimates of the carcinogenic potency of arsenic once that information is available.* The water quality standards for the protection of aquatic life applies to total dissolved inorganic arsenic in the water, even though arsenic (V) generally is more toxic to aquatic organisms than arsenic (III).

(2) The water quality standards for the protection of aquatic life are based on total dissolved cadmium in the water column. The toxicity of cadmium to freshwater organisms varies with water hardness. The value in the table reflects a water hardness of 100 mg/L as $CaCO_3$. For other values of water hardness, the standard can be recalculated using the following equations:

(2a) Acute Standard =
exp{1.128 [ln(hardness)] - 3.6867} x {1.136672 - [ln(hardness) (0.041838)]}
(2b) Chronic Standard =
exp{0.7852 [ln(hardness)] - 2.715} x {1.101672 - [ln(hardness) (0.041838)]}

where hardness is expressed as mg/L $CaCO_3$ in the water (Source: USEPA, 1999).

(3) The State of Florida has established 0.01 ug/L for its water quality standard for chlorine across all categories. If chlorine is a contaminant of special concern in the Bahamas, further evaluation of the interim standards should be conducted as early as practicable.

(4) The water quality standards for the protection of aquatic life are based on total dissolved chromium (III) in the water column. The toxicity of chromium III to freshwater organisms varies with water hardness; the value in the table reflects a water hardness of 100 mg/L as $CaCO_3$. For other values of water hardness, the standard can be recalculated using the following equations:

(4a) Acute Standard = exp{0.8190 [ln(hardness)] + 3.7256} x 0.316
(4b) Chronic Standard = exp{0.8190 [ln(hardness)] + 0.6848} x 0.860

where hardness is expressed as mg/L $CaCO_3$ in the water (Source: USEPA, 1999).

(5) The water quality standards for the protection of aquatic life are based on total dissolved chromium (VI) in the water column. Although the toxicity of chromium (VI) to freshwater organisms might depend on water hardness, insufficient data were available to estimate the relationship between toxicity and water hardness. In the absence of information on the speciation of chromium in the water column, the water quality standard for chromium (VI) is recommended to ensure the value is protective. In most aquatic systems, chromium (III) predominates, however.

(6) The water quality standards for the protection of aquatic life are based on total dissolved copper in the water column. The toxicity of copper to freshwater organisms varies with water hardness. The value in the table reflects a water hardness of 100 mg/L as $CaCO_3$. For other values of water

hardness, the standard can be recalculated using the following equations:

(6a) Acute Standard = $\exp\{0.9422 [\ln(\text{hardness})] - 1.700\} \times 0.960$
(6b) Chronic Standard = $\exp\{0.8545 [\ln(\text{hardness})] - 1.702\} \times 0.960$

where hardness is expressed as mg/L $CaCO_3$ in the water (Source: USEPA, 1999).
When the concentration of dissolved organic carbon in the water is elevated, copper is substantially less toxic and use of Water-Effect Ratios is recommended to estimate a standard for such waters in The Bahamas.

(7) These interim water quality standards for the protection of aquatic life life are based on an analysis by the USEPA published in 1976 and apply to total iron.

(8) The water quality standards for the protection of aquatic life are based on total dissolved lead in the water column. The toxicity of lead to freshwater organisms varies with water hardness. The value in the table reflects a water hardness of 100 mg/L as $CaCO_3$. For other values of water hardness, the standard can be recalculated using the following equations:

(8a) Acute Standard =
$\exp\{1.273 [\ln(\text{hardness})] - 1.460\} \times \{1.46203 - [\ln(\text{hardness}) (0.145712)]\}$
(8b) Chronic Standard =
$\exp\{1.273 [\ln(\text{hardness})] - 4.705\} \times \{1.46203 - [\ln(\text{hardness}) (0.041838)]\}$

where hardness is expressed as mg/L $CaCO_3$ in the water (Source: USEPA, 1999).

(9) The water quality standards for the protection of aquatic life are based on total dissolved mercury in the water column. This interim water quality standard was derived from data for inorganic mercury (II), but is applied here to total mercury. If a substantial portion of the mercury in the water column is methylmercury, this criterion will probably be under-protective. This interim value is also under-protective because it does not account for uptake of mercury via aquatic food chains. In aquatic ecosystems and organisms, most inorganic mercury is converted to methylmercury, and methylmercury bioaccumulates to a great extent in aquatic food chains.

The water quality standards for the protection of human health were modified from the USEPA 1999 recommended criteria to account for higher fish ingestion rates likely for the people of The Bahamas compared with the US population. The USEPA criteria for drinking water and fish consumption (0.05 µg/L) and for fish consumption only (0.05 µg/L) assumes a 70 kg individual drinking 2 liters of water and eating 6.5 grams of fish daily. The criteria for The Bahamas assume a 70 kg individual drinking 2 liters of water and eating 114 grams of fish daily (the equivalent of consuming one 4-ounce serving of fish daily or one 8-ounce serving of fish every other day). The bioaccumulation factor (i.e., the ratio of the mercury concentration in edible fish tissues to the mercury concentration in the water column) used to calculate the criteria was 80,000. *An update to this interim standard that will include consideration of the toxicity and bioaccumulation of methylmercury is under development.*

(10) The water quality standards for the protection of aquatic life are based on total dissolved nickel in the water column. The toxicity of nickel to freshwater organisms varies with water hardness.

The value in the table reflects a water hardness of 100 mg/L as $CaCO_3$. For other values of water hardness, the standard can be recalculated using the following equations:

(10a) Acute Standard = exp{0.8460 [ln(hardness)] + 2.255} x 0.998
(10b) Chronic Standard = exp{0.8460 [ln(hardness)] + 0.0584} x 0.997

where hardness is expressed as mg/L $CaCO_3$ in the water (Source: USEPA, 1999).

The water quality standards for the protection of human health were modified from the USEPA 1999 recommended criteria to account for higher fish ingestion rates likely for the people of The Bahamas compared with the US population. The USEPA criterion for drinking water and fish consumption of 610 µg/L assumes a 70 kg individual drinking 2 liters of water and eating 6.5 grams of fish daily. The criterion for The Bahamas assumes a 70 kg individual drinking 2 liters of water and eating 114 grams of fish daily (the equivalent of consuming one 4-ounce serving of fish daily or one 8-ounce serving of fish every other day). Similarly, the USPEA criterion for fish consumption only of 4,600 µg/L assumes an average daily ingestion of 6.5 grams of fish, while the water quality standard for The Bahamas assumes an ingestion rate of 114 grams of fish daily. The bioaccumulation factor for nickel (i.e., the ratio of the nickel concentration in edible fish tissues to the nickel concentration in the water column) used for the calculation was 47.

(11) Phosphorous in its phosphate form can contribute to the growth of nuisance aquatic algae and plants. Algal growths can cause undesirable tastes and odors in water, interfere with water treament, and contribute to undesirable changes in the aquatic ecosystem. To protect against development of biological nuisance growths, total phosphates as phosphorus (P) should not exceed 50 µg/L in any stream at the point where it enters a lake or reservoir nor exceed 25 µg.L within the lake or reservoir. In water bodies for which phosphorous is not a limiting nutrient, this standard may be relaxed at the discretion of the Director. Because phosphorous is only one of several nutrients and other conditions influence plant growth in both fresh and saltwaters, site-specific modification of these criteria can be proposed for review by the Director.

(12) The freshwater acute value for selenium is = 1/[f1/CMC1) + (f2/CMC2)] where f1 and f2 are the fractions of total selenium that are treated as selenite and selenate, respectively, and CMC1 and CMC2 are 185.9 µg/L and 12.83 µg/L, respectively. The interim saltwater criteria for the protection of aquatic life does not account for potential bioaccumulation of selenium in the aquatic food web. Thus, the status of the fish community should be monitored whenever the concentration of selenium exceeds 5.0 µg/L in saltwater.

The water quality standards for the protection of human health were modified from the USEPA 1999 recommended criteria to account for higher fish ingestion rates likely for the people of The Bahamas compared with the US population. The USEPA criteria for drinking water and fish consumption (170 µg/L) and for fish consumption only (11,000 µg/L) assume a 70 kg individual drinking 2 liters of water and eating 6.5 grams of fish daily and assume a bioaccumulation factor of 1.0. The criteria for The Bahamas assume a 70 kg individual drinking 2 liters of water and eating 114 grams of fish daily (the equivalent of consuming one 4-ounce serving of fish daily or one 8-ounce serving of fish every other day) and assume a bioaccumulation factor of 80, based on studies conducted after the USEPA developed its criteria for selenium.

(13) The water quality standards for the protection of aquatic life are based on total dissolved silver in the water column. The toxicity of silver to freshwater organisms varies with water hardness. The value in the table reflects a water hardness of 100 mg/L as $CaCO_3$. For other values of water

hardness, the acute standard can be recalculated using the following equation:

(13a) Acute Standard = $\exp\{1.72 [\ln(\text{hardness})] - 6.52\} \times 0.85$

where hardness is expressed as mg/L $CaCO_3$ in the water (Source: USEPA, 1999).

(14) The water quality criterion for zinc was set considering both its toxicity at high exposure levels and its essentiality as a nutrient at low doses.

The water quality standards for the protection of human health were modified from the USEPA 1999 recommended criteria to account for higher fish ingestion rates likely for the people of The Bahamas compared with the US population. The USEPA criteria for drinking water and fish consumption (9,100 µg/L) and for fish consumption only (69,000 µ/L) for zinc assume a 70 kg individual drinking 2 liters of water and eating 6.5 grams of fish daily. The criteria for The Bahamas assume a 70 kg individual drinking 2 liters of water and eating 114 grams of fish daily (the equivalent of consuming one 4-ounce serving of fish daily or one 8-ounce serving of fish every other day). The bioaccumulation factor used to calculate the criteria was 160.

(15) Aldrin is classified as a probable human carcinogen via oral exposure (see Schedule 6).

The values for the protection of human life are based on the assumptions of 6.5 grams of fish and 2 liters of water ingested daily by a 70 kg individual and a risk level of 10^{-6}. Assuming 114 grams of fish consumed daily, the risk level would be approximately 2×10^{-5}.

(16) Cyanide is not classifiable as to its potential carcinogenicity (see Schedule 6).

(17) Polychlorinated biphenyls (PCBs). PCBs are a class of chemicals which include aroclors 1242, 1254, 1221, 1232, 1248, 1260, and 1016, CAS numbers 53469219, 11097691, 11104282, 11141165, 12672296, 11096825, and 12674112, respectively. The values for the protection of human health apply to total PCBs, i.e., the sum of all congener or all isomer analyses.

The values for the protection of human life are based on the assumptions of 6.5 grams of fish and 2 liters of water ingested daily by a 70 kg individual and a risk level of 10^{-6}. Assuming 114 grams of fish consumed daily, the excess lifetime risk level would be approximately 2×10^{-5} (two cases in a population of one hundred thousand people).

(18) Chlordane is classified as a probable human carcinogen via oral exposure (see Schedule 6).

The values for the protection of human life are based on the assumptions of 6.5 grams of fish and 2 liters of water ingested daily by a 70 kg individual and a risk level of 10^{-6}. Assuming 114 grams of fish consumed daily, the risk level would be approximately 2×10^{-5}.

(19) DDT is classified as a probable human carcinogen via oral exposure (see Schedule 6).

The values for the protection of human life are based on the assumptions of 6.5 grams of fish and 2 liters of water ingested daily by a 70 kg individual and a risk level of 10^{-6}. Assuming 114 grams of fish consumed daily, the risk level would be approximately 2×10^{-5}.

(20) Water quality criteria are for both the alpha and beta isomers of endosulfan.

(21) Water quality criteria for endrin for the protection of human health (for waters used for drinking and fish consumption) is based on a noncarcinogenic endpoint.

(22) Parathion is classified as a possible human carcinogen via oral exposure (see Schedule 6).

(23) Toxaphene is classified as a probable human carcinogen via oral exposure (see Schedule 6).

B. Standards for Bacteria in Surface Waters

Freshwater:

Escherichia coli should not exceed 126 cells/100 ml
enterococci should not exceed 33 cells/100 ml

Saltwater:

enterococci should not exceed 35 cells/100 ml

The monitoring value to determine compliance with the standards is the geometric mean of five equally spaced samples taken over a 30-day period (USEPA. 1986. *Ambient Water Quality Criteria for Bacteria - 1986*; EPA-440-5-84-002). The Bahamas should also establish a single sample maximum based on the expected frequency of use of a water body. The USEPA has recommended appropriate single-sample maximum values for different frequencies of use in its 1986 criteria document.

C. Additional Narrative Standards

Color Standard:

The waters of The Bahamas shall be free from substances producing objectionable color for aesthetic purposes. The source should not exceed 75 color units on the platinum-cobalt scale for domestic water supplies. The depth of the compensation point for photosynthetic activity should not be lowered due to coloration by more than 10 percent from the normal seasonal patterns for aquatic life.

The sources of discoloration can be from complex organic compounds including humic materials from the soil as well as decaying plankton and other aquatic plants. Industrial discharges can contribute to discolored water, especially from textile and chemical industries that often release brightly colored substances.

Increased coloration in the water restricts light from penetrating to aquatic life. As a result, a reduction of photosynthesis by phytoplankton will occur and lower the zone for aquatic plant growth.

Source: USEPA (1976) *Quality Criteria for Water.* U.S. Environmental Protection Agency, Washington, DC.

pH Standards:

pH Range	*Water Sources*
5 - 9	Domestic Water Supplies
6.5 - 9.0	Freshwater Aquatic Life
6.5 - 8.5	Marine Aquatic Life

Rationale: The chemical and biological systems of natural waters are controlled, in part, by the pH of the water. The "buffering capacity" of a waterbody helps to neutralize additions of acids or bases, helping to maintain a stable pH. Many aquatic organisms require a steady pH for their life processes, and the toxicity of many compounds and pollutants is affected by changes in pH. For instance, cyanide toxicity in fish increases as pH is lowered (the water becomes more acidic) because of an increased concentration of HCN. Likewise, rapid increases in pH can cause ammonia (NH_3) concentrations to rise to toxic levels. Soluble metal compounds added to waters also can alter pH; metal compounds in bottom sediments or suspended materials can cause similar effects. The following table summarizes some general trends in the effect of pH on fish species.

pH range	*Effect on Fish*
5.0 - 6.0	Unlikely to be harmful to any species unless either the concentration of free CO2 is greater than 20 ppm or the water contains iron salts which are precipitated as ferric hydroxide, the toxicity of which is not known.
6.0 - 6.5	Unlikely to be harmful to fish unless free CO2 is present in excess of 100 ppm.
6.5 - 9.0	Harmless to fish, although the toxicity of other poisons may be affected by changes within this range.

Solids (suspended, settleable) and Turbidity Standard

For the protection of freshwater fish and other freshwater aquatic life, settleable and suspended solids should not reduce the depth of the compensation point for photosynthetic activity by more than 10 percent from the seasonally established norm for aquatic life.

Definition: *Suspended solids and settleable solids* is descriptive of the organic and inorganic particulate matter in water.

Rationale: Plankton and inorganic suspended materials reduce light penetration into surface waters, thereby reducing the depth of the photsynthetic zone. This results in diminishing primary production and a reduction in the abundance of food available to fish. Suspended solids in water limit fish from swimming and may reduce their growth rate, resistance to disease, and could even lead to mortality. Suspended solids could also inhibit development of fish eggs and larvae. Lastly, suspended solids could alter the natural movements and migrations of fish.

Settleable materials can often cover the bottom of water bodies harming the invertebrate populations, spawning beds, and if organic, remove dissolved oxygen from overlying waters. These effects are of particular concern for coral reefs. Where discernable settling of particulate matter or sediments on the surface of coral reefs in the waters of The Bahamas is detected, the source(s) of the material must be identified and measures implemented to reduce the loading of suspended solids to the vicinity of those corals.

Schedule 6

HUMAN HEALTH BASED TOXICITY REFERENCE VALUES USED TO DERIVE AMBIENT WATER QUALITY STANDARDS FOR CHEMICAL POLLUTANTS PRESENTED IN SCHEDULE 5

CAS Number	Pollutant	Noncancer Effects		Cancer				
		RfD (mg/kg-day)	Source	oral slope factor (mg/kg-day)	drinking water unit risk (per ug/L)	concentration associated with 10-6 risk level (ug/L)	Classi-fication (oral)	Source
Inorganic Compounds								
7440382	Arsenic	3 x 10-4	USEPA	1.5	5 x 10-5	2 x 10-2	A	USEPA[(a)]
7440439	Cadmium (water)	5 x 10-4	USEPA				B1	USEPA[(a)]
7440439	Cadmium (food)	1 x 10-3	USEPA				--	
7782505	Chlorine	1 x 10-1	USEPA					
16065831	Chromium III							
18540299	Chromium VI	3 x 10-3	USEPA					
7439921	Lead	under evaluation					B2	USEPA[(a)]
7439976	Mercury (mercuric chlroide, 7487947)	3 x 10-4	USEPA					
7440020	Nickel (soluble salts, no CAS no.)	2 x 10-2	USEPA					
7782492	Selenium	5 x 10-3	USEPA				D	USEPA[(a)]
7440224	Silver	5 x 10-3	USEPA				D	USEPS[(a)]

CAS Number	Pollutant	Noncancer Effects		Cancer				
		RfD (mg/kg-day)	Source	oral slope factor (mg/kg-day)	drinking water unit risk (per ug/L)	concentration associated with 10-6 risk level (ug/L)	Classi-fication (oral)	Source
7440666	Zinc	3 x 10-1	USEPA					
Organic Compounds								
309002	Aldrin	3 x 10-5	USEPA	under evaluation			B2	USEPA[(a)]
57125	Cyanide	2 x 10-2	USEPA				D	USEPA[(a)]
7723140	PCBs (Aroclor 1254)	2 x 10-5						
7723140	PCBs (Aroclor 1016)	7 x 10-5						
57749	Chlordane	5 x 10-4	USEPA	under evaluation			B2	USEPA[(a)]
50293	DDT	5 x 10-4	USEPA	under evaluation			B2	USEPA[(a)]
959988	Endosulfan (alpha)	6 x 10-3	USEPA					
72208	Endrin	3 x 10-4	USEPA					
121755	Malathion	2 x 10-2	USEPA					
72435	Methoxychlor	5 x 10-3	USEPA				D	USEPA[(a)]
2385855	Mirex	2 x 10-4	USEPA					
56382	Parathion						C	USEPA[(a)]
8001352	Toxaphene			1.1	3.2 x 10-5	3 x 10-2	B2	USEPA[(a)]

(a) US Environmental Protection Agency (USEPA) Integrated Risk Information System (IRIS) online: www.epa.gov/IRIS

USEPA classification of weight of evidence for carcinogenicity: A = known human carcinogen (sufficient evidence from epidemiological studies or other human studies); B = probably human carcinogen (sufficient evidence in animals and limited or inadequate evidence in humans; B1 is for agents for which there is limited evidence of carcinogenicity from epidemiological studies and B2 is for agents for which there is sufficient evidence from animals studies but for which there is inadequate evidence or no data from epidmiological studies); C = possible human carcinogen (limited evidence of carcinogenicity in animals in the absence of human data); D = not classifiable as to carcinogenicity in humans (inadequate or no animal evidence of carcinogenicity); and E = evidence of noncarcinogenicity for humans (no evidence of carcinogenicity in at least two adequate animal tests in different species or in both adequate epidemiological and animal studies) (based on 1986 USEPA *Guidelines for Carcinogen Risk Assessment*).

RfD is an estimate (with uncertainty spanning an order of magnitude) of a daily exposure to the human population (including sensitive subgroups) that is likely to be without an appreciable risk of deleterious effects during a lifetime.

Not all of the water quality criteria recommended by the USEPA or the water quality standards adopted by Hawaii reflect the most recent toxicity values in IRIS. In particular, the cancer potency values for several pesticides have been removed from IRIS for further evaluation.

Schedule 7

AMBIENT AIR LIMIT VALUES

Limit values must be expressed in $\mu g/m^3$. The volume must be standardized at a temperature of 293ºK and a pressure of 101.3 kPa.

Numerical standards.

Pollutant

(1) sulphur dioxide

	Averaging period	Limit value
1. Hourly limit value for the protection of human health	1 hour	350 $\mu g/m^3$, not to be exceeded more than 24 times a calendar year
2. Daily limit value for the protection of human health	24 hours	125 $\mu g/m^3$, not to be exceeded more than 3 times a calendar year
3. Limit value for the protection of ecosystems	Calendar year and winter (1 October to 31 March)	20 $\mu g/m^3$

(2) nitrogen dioxide and oxides of nitrogen

	Averaging period	Limit value
1. Hourly limit value for the protection of human health	1 hour	200 $\mu g/m^3$ NO_2 not to be exceeded more than 18 times a calendar year
2. Annual limit value for the protection of human health	Calendar year	40 $\mu g/m^3$ NO_2
3. Annual limit value for the protection of vegetation	Calendar year	30 $\mu g/m^3$ NOx

(3) particulate matter (PM_{10})

	Averaging period	Limit value
STAGE 1		
1. 24-hour limit value for the protection of human health	24 hours	50 $\mu g/m^3$ PM_{10} not to be exceeded more than 35 times a calendar year
2. Annual limit value for the protection of human health	Calendar year	40 $\mu g/m^3$ PM_{10}

(4) Lead

	Averaging period	Limit value
Annual limit value for the protection of human health	Calendar year	0.5 µg/m^3 ([1])
2. Annual limit value for the protection of human health	Calendar year	40 µg/m^3 PM_{10}

(5) Ozone

	Averaging period	Limit value
Eight-hour limit value for the protection of human health	Eight hour moving average	110 µg/m^3 for the mean value over eight hours
Vegetation protection limit value		200 µg/m^3 for the mean value over one hour 65 µg/m^3 for the mean value over 24 hours

Reference Methods for Assessment of Concentrations of Sulphur Dioxide, Nitrogen Dioxide, and Oxides of Nitrogen, Particulate Matter (PM_{10} and PM_{23}), and Lead

I. Reference method for the analysis of sulphur dioxide:

ISO/FDIS 10498 (Standard in draft) Ambient air — determination of sulphur dioxide — ultraviolet fluorescence method, or any other method which can be demonstrated to give results equivalent to the above method.

II. Reference method for the analysis of nitrogen dioxide and oxides of nitrogen:

ISO 7996: 1985 Ambient air — determination of the mass concentrations of nitrogen oxides — chemiluminescence method, or any other method which can be demonstrated to give results equivalent to the above method.

III. Reference method for the analysis of lead:

ISO 9855: 1993 Ambient air — Determination of the particulate lead content of aerosols collected in filters. Atomic absorption spectroscopy method, or any other method which can be demonstrated to give results equivalent to the above method

IV. Reference method for the sampling and measurement of PM_{10}

The reference method for the sampling and measurement of PM_{10} will be that described in EN 12341 "Air Quality — Field Test Procedure to Demonstrate Reference Equivalence of Sampling Methods for the PM_{10} fraction of particulate matter." The measurement principle is based on the collection on a filter of the PM_{10} fraction of ambient particulate matter and the gravimetric mass determination, or any other method which can be demonstrated to give results equivalent to the above method.

Source: Council Directive 1999/30/EC of 22 April 1999

Schedule 8

OZONE DEPLETING SUBSTANCES

1. CFC-11, also known as fluorotrichloromethane;

2. CFC-12, also known as dichlorodifluoromethane;

3. CFC-113, also known as 1,1,2-trichloro-1,2,2-trifluoroethane;

4. CFC-114, also known as 1,2-dichloro-1,1,2,2-tetrafluoroethane;

5. CFC-115, also known as 1-chloro-1,1,2,2,2-pentafluoroethane;

6. Halon-1211, also known as bromochlorodifluoromethane;

7. Halon-1301, also known as bromotrifluoromethane;

8. Halon-2402, also known as dibromotetrafluoroethane;

9. HCFC-22, also known as chlorodifluoroemthane (refrigeration and air conditioning use only, foam insulation excluded);

10. Carbon tetrachloride;

11. Methyl chloroform, also known as 1,1,1-trichloroethane.