APPENDIX B

ENVIRONMENTAL MANAGEMENT PLAN - OPERATIONS

ENVIRONMENTAL MANAGEMENT PLAN
FOR THE OPERATION OF THE
TRENTS GENERATING STATION

Submitted to:

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1.0 INTRODUCTION

1.1 Purpose

The Barbados Light & Power Company Limited (BLPC) recognises its responsibility to minimize the effects of its operations on the environment, and seeks to provide leadership by promoting environmental awareness and accountability.

BLPC operates its facilities in accordance with good industry practices to minimize the effects on the environment. The Company will commit the necessary resources to meet the following environmental objectives:

a) **Use of Resources** - To conserve non-renewable resources through efficient use and, where appropriate, to use renewable resources.

b) **Waste Reduction & Disposal** - To minimise the creation of waste by reuse and recycling of materials and by implementing the use of recyclable materials. Procurement procedures will recognize the need to minimize waste where practical by purchasing supplies with minimal packaging, substituting hazardous products with less hazardous products and using recyclable products. To dispose of all waste in a safe and sustainable manner and to minimise the release of substances which cause damage to the natural environment.

c) **Product Safety** - To ensure the safe and secure supply of electricity to the consumer.

d) **Risk Reduction** - To minimise the environmental, health, and safety risks to employees and the public, by employing safe technologies and operating procedures and by constantly being prepared for emergencies.

e) **Education and Training** - To increase the awareness and understanding of environmental issues by our employees.

f) **Public Information** - To keep employees and the public informed on environmental issues relating to Company operations.

g) **Quality Management** - To establish regular inspections and periodic audits of the Company's operations by suitably qualified persons.

1.2 Description of Plant and Scope of Environmental Management Plan

The Trents Generating Station will be a major source of electricity generation in Barbados and will be providing base load power to the Barbados system. The Company is proposing the site for the staged development of 240MW over three phases. Two generation options are being considered:

- Low-speed diesel units in pairs of 30MW, 40MW and 50MW respectively operating on heavy fuel oil with distillate used for start-up and shutdown and as an auxiliary fuel; and
- Gas turbine combined cycle plants of 60MW, 80MW and 100MW respectively, operating on natural gas with distillate fuel as back-up.

As the site development progresses it may include one or both modes of generation. The project also includes an oil pipeline from the Arawak cement plant wharf to the plant and unloading facilities at the wharf and may include a natural gas pipeline from Checker Hall.

This Environmental Management Plan (EMP) provides a framework for addressing environmental issues for the operation of the new facilities (low speed diesel and gas) in a repeatable, organized and responsible manner consistent with the policy of the Company to be a good corporate citizen. It identifies the scope of the environmental requirements, provides implementation guidelines, sets quantifiable targets and includes provision for checking and corrective action and management review to ensure compliance with the stated regulations.

2.0 ENVIRONMENTAL PLANNING

2.1 Conditions of Approval

The plant approval is subject to conditions as may be set out in the approval from the Chief Town Planner. Where there is a difference in the conditions of approval and the environmental guidelines and standards presented herein, the conditions of approval take precedence. The operator must refer to the approval document to ensure that all conditions are met.

2.2 Environmental Aspects

Environmental management involves compliance with: local planning requirements and environmental regulations; adherence to the company's own guidelines, practices and procedures; and conformity with good management practices and standards of the industry.

The environmental aspects of the new plant operations are as follows:

a) Air emissions;
b) Noise emissions;
c) Waste water discharges;
d) Waste disposal; and
e) Spills.

The mitigating measures which will be implemented to reduce the impact of these plant operations are outlined as follows:

a) There is a limited opportunity to reduce the emissions for air and noise through improvements to operational procedures. These emissions depend largely on the characteristics of the generating equipment installed and the controls that have been built into the station.

b) The operational practices at the plant can have an impact on the quality of wastewater discharged. Maintenance of wastewater treatment facilities, together with ongoing monitoring, can ensure that all equipment is functioning at optimum performance.

c) The generation of power either by low speed diesels or combined cycle does not produce significant quantities of wastes for disposal. The wastes produced are incidental to the operations and related to maintenance activities and office wastes.

d) Spills can be prevented from causing an adverse environmental impact by storing liquid fuels and chemicals in secure containment areas, and by the adherence to good

management practices. A spill response procedure provides the company with a mechanism for emergency preparedness.

2.3 Air Emissions

Low Speed Diesels Plants

Emissions of oxides of nitrogen (NO_X) from the low speed diesels are controlled by the use of low NO_X injectors and emissions of particulate matter by dry electrostatic precipitators to meet World Bank standards for engine driven power plants. Emissions of SO_2 are dependent on the sulphur content of the fuel and will be controlled by the use of low sulphur fuel.

Combined Cycle Plants

Emissions from natural gas fired combined cycle plants are controlled by the use of low NO_X combustors Particulate and SO_2 emissions are minimal from natural gas combustion and readily meet regulatory standards without controls.

2.3.1 Applicable Standards

There are no criteria for air quality currently in force in Barbados, and so BLPC will refer to other recognised international standards as a goal for controlling emissions. The World Bank has established specific ambient air quality guidelines for the approval of thermal power plants; these can be found in - *Pollution Prevention and Abatement Handbook 1998 - Part III.* The emissions standards are listed in Table 2.1 and the ambient air quality standards are listed in Table 2.2.

Table 2-1 World Bank Emission Limits for Engine Driven Power Plants

Stack Emissions from Power Plants (Based on WBG)	mg/Nm^3
Particulate Matter TSP	50
Sulphur Dioxide Background air quality <50 µg/m^3 Total mass emission	 0.20 tonnes/day/MWe 500 tonnes/day
Nitrogen Oxides Gas turbine plants (natural gas) Gas turbine plants (#2 fuel oil) Engine driven plants (resultant ambient air < 150 µg/m^3)	 125 (dry @ 15% O_2) 165 (dry @ 15% O_2) 2,000 (dry @ 15% O_2)

mg/Nm^3 = milligrams per normal cubic metre (at reference temperature of 0^{o}C and 1 atmosphere pressure)

Table 2-2 Ambient Air Quality Standards Established By The World Bank For New Thermal Power Plants

Ambient Air Quality (Outside Property Boundary)	µg/m^3
Particulate Matter	
Annual mean, **PM_{10} (<10 µm)**	50
98 Percentile of 24 hour mean values of **PM_{10}**	150
Annual average of Total Suspended Particulates	80
98 Percentile of 24 hour mean values of **TSP**	230
Sulphur Dioxide	
Annual mean	50
98 Percentile of 24 hour mean values	150
Nitrogen Oxides, as NO_2	
Annual mean	100
98 Percentile of 24 hour mean values	150

µg/m^3 = micrograms per cubic metre
PM_{10} = particulate matter of less than 10 micrometres in size

The plant has been designed and specified to meet the World Bank Standards for engine-driven power plants. The following emissions rates are estimated.

Table 2-3 Emissions Rates for Low Speed Diesels Option (grams/second)

Contaminant	Stage 1 (2 x 30 MW)	Stage 2 (2 x 40 MW)	Total Stages 1 and 2 (140 MW)	Stage 3 (2 x 50 MW)	Station Total (240 MW)
NO_x as NO_2	218.9	291.9	510.8	364.9	875.7
CO	6.9	9.2	16.1	11.5	27.5
SO_2	152.1	202.8	354.9	253.5	608.3
PM	3.7	5.0	8.7	6.2	14.9
PM-10	2.7	3.6	6.3	4.5	10.8
CO_2	10502	14002	24504	17504	42008

Table 2-4 Emissions Rates for Combined Cycle Option (grams/second)

Contaminant	Natural Gas Fuel (240MW)	Distillate Fuel (240MW)
NO_x as NO_2	12.2	33.52
SO_2	0.08	32.10
PM	0.29	0.64
PM-10	0.14	0.32

2.3.2 Air Quality and Emissions Monitoring

1. As part of the commissioning program for the new generating equipment, confirmatory testing of the air emissions will be conducted to ensure that they meet the stated specifications. The tests will be completed over a range of loads including full load and a report submitted outlining the test method used. The confirmatory testing will be completed by competent specialists.

2. Continuous emissions monitors (CEMs), such as for NO_X and opacity (LSD units only), provide real time measurements of emissions. These will be installed and maintained and calibration checks conducted based on the manufacturers instructions. The opacity meter should be calibrated during the commissioning tests, so as to develop a correlation between particulate concentrations and opacity. This can be used as a surrogate measure to ensure that the emissions adequately meet the 50 mg/Nm^3 World Bank limit following confirmatory testing.

3. The SO_2 emissions rate for the natural gas fired option is not a concern due to the extremely low levels of sulphur contained in the fuel. The SO_2 emissions rate (g/s) for the LSD can be calculated and compared to Table 2-3 from the rate of fuel consumption and sulphur content of the fuel as follows:

$$\frac{\text{Fuel consumption (kg/ h) } \mathbf{x} \text{1000 (g/kg) } \mathbf{x} \text{ S content of fuel (\%) } \mathbf{x} \text{ 64 (mol. wt of } SO_2)}{\text{3600 (seconds/h) } \mathbf{x} \text{ 100 (\% conversion to fraction) } \mathbf{x} \text{ 32 (atomic wt of S)}}$$

4. To assess the long-term air quality, ambient air monitoring will be completed in the area surrounding the plant and at a control point before and following start up to determine if there are any long term effects. Passive monitors will be used to assess the monthly averages of SO_2, NO_2 and ozone. The following program is recommended:

   i. The monitors should be placed at a location downwind of the plant to the west of the site. An additional control point will be taken remote from the site to observe conditions outside of the influence of the plant;

ii. The same locations will preferably be used for the entire monitoring program to assess changes;

iii. The monthly monitoring program will commence 3-months prior to start up and continue for 6-months after successful start-up (plant fully operational);

iv. After the 6-month post start-up period, the monitoring program will be reduced to quarterly samplings for a further period of 6-months.

v. At the end of one year following plant start-up the results will be reviewed and compared with the World Bank standards for annual mean levels of SO_2, and NO_2. If all results are less than 75% of those standards, the monitoring will be suspended;

vi. If any results indicate that the levels are higher than the standards, the sampling frequency will be restored to monthly, until the cause is determined; and

vii. The monitoring program will be repeated for successive expansions of the site.

2.3.3 Operational Considerations

1. Complaints about air quality should be followed up promptly so that the problem can be witnessed, the cause assessed and corrective action taken. A response should be provided to the complainant and a report provided to the Generation Manager.

2. Should the plant emissions levels of NO_X as measured by the CEMs exceed World Bank Standards as per Table 2.3, the Generation Manager should be advised, so that action can be taken to determine the cause and restore compliance?

2.4 Noise Emissions

2.4.1 Applicable Standards

There are no noise emission standards in Barbados. However, the WBG has established guidelines for noise from power plants (WBG 1998). Noise levels on an average hourly basis should either be less than the levels of the following table at receptors outside the property boundary or a maximum increase of 3 dBA above background.

Table 2-4 Ambient Noise Objectives

Area		Noise Level at Receptors Outside of Property Boundary (dBA)	
		Day	Night
WBG Noise Standards	Residential, Institutional, Commercial	55	45
	Industrial, Commercial	70	70

2.4.2 Monitoring

1. Sound levels should be taken at the St. Lucy School , the St. Lucy Church and the closest residence prior to and following commissioning to confirm that sound levels do not exceed the above standards.

2. As part of the commissioning program for the new generating equipment, confirmatory testing of the noise levels during operation will be conducted to ensure that they meet the stated specifications. The tests will be completed over a range of loads including full load and a report submitted outlining the test method used. The confirmatory testing will be completed by competent specialists.

3. The monitoring program should be repeated at the time of each plant expansion.

2.4.3 Operational Considerations

1. To prevent noise from open doors impacting the community, engine room doors should normally be kept closed.

2. Complaints about noise will be followed up promptly so that the problem can be witnessed, the cause assessed and corrective action taken. A response should be provided to the complainant and a report provided to the Generation Manager.

2.5 Waste Water Discharges

Minor discharges from the plant floor drains will be treated in an oily water treatment system before release to the site drainage.

Sanitary sewage will be treated in a septage system.

2.5.1 Applicable Standards

Amendments to the Marine Pollution Act include the following general effluent guidelines for discharge of sewage to a soak pit:

Table 2-5 End-of-Pipe Discharge Standards for Sewage Wastewater

Parameter	End of Pipe Standard for Discharge into Class 1 Waters
Biochemical Oxygen Demand	30mg/L
Total Suspended Solids	30mg/L
Total Nitrogen (organic and inorganic)	5mg/L
Total Phosphorus (organic and inorganic)	1mg/L
pH	6-9
Faecal streptococci	Geometric mean of min. 5 samples should not exceed 35 colonies/100mL in any 30- day period.
Faecal coliform	Geometric mean of min. 5 samples should not exceed 200 colonies/100mL in any 30-day period. No more than 10% of samples to exceed 400 colonies/100ml.
Total Residual Chlorine	0.1mg/L
Fats, Oils and Grease	15mg/L
Floatables	Not visible

mg/L = milligram per litre mL = millilitres

In addition, discharges from treated sump drainage and the tank farm drainage will need to meet the criteria of the “Petroleum Hydrocarbon End of Pipe Standards”.

Table 2-6 End-of-Pipe Discharge Standards Petroleum Hydrocarbons

Compound	End of Pipe Standard for Discharge into Class 1 Waters (mg/L)
Total Petroleum Hydrocarbons	Maximum daily discharge concentration: 10 Average consecutive 30-day concentration: 5
Total Oil and Grease	Maximum daily discharge concentration: 10 Average consecutive 30-day concentration: 5
Total Organic Carbon	Maximum daily discharge concentration: 110 Average consecutive 30-day concentration: 55

BLPC will adopt these limits as the target effluent.

2.5.2 Effluent Monitoring of Plant Sump Drainage and Tank Farm Drainage

1. Direct discharges of wastewater from the oily water separator will be monitored in accordance with the parameters specified in the Table 2-6.

2. Samples will be taken and analysed monthly for the first year of operation, and if they are found to be fully compliant with Table 2-6, the frequency will be amended to quarterly sampling.

3. Should any result exceed the target levels of Table 2-6, the cause will be determined and the monthly sampling frequency should be restored until the effluent results meet the levels of Table 2-6.

4. In addition to the above program specific to oily discharges, on an annual basis and within 3 months of start-up, the effluent from the plant will be also be sampled for the range of parameters of Table 2-5 (except faecal coliform and faecal streptococci). If the results exceed any of the guideline limits, the cause will be investigated and the effluent should be resampled.

2.5.3 Operational Considerations

1. A major improvement to effluent quality can be achieved by reducing losses of oil to the drainage system. This is possible by adherence to good operating practices by good housekeeping.

2. The oily water separators will be cleaned on a frequent basis to maintain optimum efficiency. At plant start-up, the oil water separator will be cleaned and desludged on a monthly basis for the first 3 months. Thereafter, the frequency will be modified based on operational experience but should be at least quarterly.

3. Wastewater quality can be improved by minimising oil spills to the ground and by cleaning up spills as they occur.

4. Drums of waste oil will be stored in a secure storage area and promptly disposed to the sludge tank to prevent spillage.

2.6 Waste Management

There are few sources of waste from an engine driven power plant. The largest source of waste for disposal will be the ash from the precipitators of the low speed diesels. The combined cycle option does not result in these wastes.

Other wastes produced at the plant, such as spent lubricating oils, oil removed from the separator and non-halogenated solvents from maintenance activities will be incinerated or reused as fuel for the steam boilers at Spring Garden.

2.6.1 Applicable Standards

The Government of Barbados has signed the Basel Convention on the control of trans-boundary movements of hazardous wastes and their disposal. The first version of a document entitled "*Methodological Guide For the Undertaking of National Inventories of Hazardous Wastes Within The Framework Of The Basel Convention*" (August, 2000), referred to generally as the "Basel Convention Guideline", is being used by the Barbados Government as a framework for reporting on the national inventory and classification of wastes. A copy is provided in Appendix H.

The general methodology set out in the Basel Convention Guideline is as follows:

i. The preparation of the inventory;
ii. The incorporation of the first results; and
iii. The maintenance of the inventory (permanent inventory).

The Basel Convention Guideline defines a waste as the following: "Wastes are substances or objects which are disposed of or are intended to be disposed of or are required to be disposed of by the provisions of national law".

Wastes can be classified as non-hazardous or hazardous. Identification of hazardous waste is based on five Annexes to the Basel Convention Guideline (see Appendix H).

In order to assist in the preparation of the inventory, the Basel Convention Guideline suggests that those industries involved in hazardous waste compile data on the generation, transportation and processing of wastes. The Guideline suggests a table that may be filled out by industry (see Appendix H).

The Basel Convention Guideline also suggests that Government carry out inspections and audits of hazardous wastes.

2.6.2 Waste Minimization

1. The reduction, reuse or recycling of wastes is encouraged as a means of lowering the use of natural resources and the Company's impact on the environment.

2. The most effective option for dealing with wastes is source reduction (not to generate them in the first place). If wastes quantities cannot be reduced then efforts will be made to minimize their environmental effect.

3. Opportunities for recycling of other wastes such as scrap metals will be explored where possible.

4. Spent oils and non-halogenated solvents will be reused as fuel in the existing steam boiler where possible. The spent oil produced will be kept free of as much foreign material as possible so that it can be burned in the steam boiler.

5. Procurement procedures will recognize the need to minimize waste packaging in the purchase of supplies.

6. Chemicals will be purchased in returnable tote packs where practical.

7. Hazardous products will be substituted by less hazardous products where equivalent performance can be assured.

8. Recyclable products will be given preference to non-recyclable products.

9. Work methods will recognize the need to minimize wastes by:

    a. Using complete contents of containers;
    b. Keeping incompatible wastes separated to avoid cross contamination;
    c. Using materials to the fullest extent possible;
    d. Reusing containers and packaging materials;
    e. Avoiding spoilage by adequately storing supplies;
    f. Using the oldest supplies first to avoid expiry;
    g. Ordering supplies in bulk containers, where practical; and
    h. Using non-hazardous substitutes.

2.6.3 Waste Disposal

Classification of waste as hazardous or non-hazardous is governed by the Basel Convention on the control of transboundary movement of hazardous wastes and their disposal. To assist in the classification of wastes produced at this site, the system recommended by the Basel Convention will be used.

2.6.3.1 Solid Wastes

1. The solid waste will be classified as hazardous or non-hazardous using the Basel Convention Guideline.

2. If the solid waste is determined to be hazardous as per the Basel Convention Guideline, an appropriate disposal option will be determined. If the hazardous waste is to be disposed locally, the means of disposal and the location will be reviewed with the Environmental Protection Department to confirm acceptability.

3. If the solid waste is determined to be non-hazardous as per the Basel Convention Guideline and the solid waste does not have recycle potential, the waste may be disposed of at the appropriate existing municipal landfill.

4. A register of the disposal locations and the type and quantity of material sent for disposal will be kept at the plant site.

5. Records will be kept of approximate volumes of waste generated at the Site. It is assumed that the Company will eventually have to fill out and submit the data compilation table suggested in the Basel Convention Guideline.

6. All waste bins going to municipal landfill will be inspected before leaving the site to ensure that the contents are appropriate for the disposal site and that no hazardous materials are included.

2.6.3.2 Liquid Wastes

1. The liquid waste will be classified as hazardous or non-hazardous using the Basel Convention Guideline.

2. If the liquid waste is determined to be hazardous as per the Basel Convention Guideline, an appropriate disposal option will be determined.

3. If the liquid waste is determined to be non-hazardous as per the Basel Convention Guideline and the liquid waste does not have recycle potential, the waste may be disposed of at the appropriate existing disposal site. Efforts will be made to reduce the liquid content where possible by thickening. The method and location of disposal will be reviewed with the Environmental Protection Department.

4. A register of the disposal locations and the type and quantity of material sent for disposal will be kept at the site.

5. Records will be kept of approximate volumes of waste generated at the Site and of volumes leaving the Site. It is assumed that the Company will eventually have to fill out and submit the data compilation table suggested in the Basel Convention Guideline.

2.7 Hazardous Materials Management

Hazardous chemicals are those, which are:

- **Reactive** - tendency of a substance to undergo chemical reaction with the release of energy.
- **Corrosive** - causes visible destruction or irreversible alterations in human skin tissue at the site of contact or has a severe corrosive rate on steel or aluminium.
- **Ignitable** - those with a flash point of less than 61^0 C; or solids capable causing fire through friction or absorption of moisture.
- **Radioactive** - uranium, thorium, their respective derivatives and compounds and any other compound capable of releasing atomic energy.
- **Toxic** - the ability of a substance to cause injury to biologic tissue.

The following management procedures are recommended for hazardous materials:

1. Chemicals will be stored in a secure manner in accordance with their hazardous characteristics.
2. Procedures will be developed to avoid storing chemicals together that are reactive such as strong oxidisers, acids, alkalis and reducers.
3. All chemicals will be stored in clearly labelled containers for easy identification.
4. BLPC will maintain a complete set of Material Safety Data Sheets (MSDS) for the chemicals in use. The list should be updated as new chemicals are obtained and it should be reviewed for accuracy on an annual basis.
5. The Material Safety Data Sheets will be checked prior to purchasing new chemicals to ensure that the hazards are known and that appropriate handling, storage, and disposal methods are available. Less hazardous substances will be substituted where possible.

6. The number of chemicals in use should be minimised where possible for simplicity.

7. Staff using the chemicals will be familiar with the recommendations for handling and storage.

8. Protective clothing and equipment as recommended by the Material Safety Data Sheets will be available to safely handle the chemicals.

2.7.1 Hazardous Materials Management and Spill Prevention

The plant uses heavy fuel oil for the operation of the LSD plant and distillate fuel for start-up. Chemicals are used in the treatment of boiler water, cooling water and in maintenance activities. Proper storage and materials handling are important to prevent adverse effects to the environment from accidental spillage, and to prevent unsafe conditions.

1. BLPC will design the plant to prevent spills to the environment. Containment structures will be provided for bulk storage of chemicals and liquid fuels. Containment pads will be provided in secure areas for the storage of drummed liquids. Nevertheless, diligent operational procedures are also required to avoid accidental losses.

2. Good management procedures to prevent accidental spills from leaving the site include:

   a. Storing drums of chemicals in designated containment areas away from roadways;

   b. Storing bulk quantities of chemicals and oils on a spill containment pad;

   c. Storing all chemicals and oils away from drains or catch basins;

   d. Providing spill containment structures for all bulk storage tanks; and

   e. Storing all chemicals in closed containers. (To avoid spillage to the soil, waste oil should not be left in open top drums.)

2.7.2 Disposal Options for Hazardous Solid or Liquid Wastes

As there is no landfill designated or designed to receive hazardous or liquid wastes in Barbados, the best efforts must be made to remove or render harmless any hazardous wastes produced. The following are potential options:

- Recycling: Some types of hazardous wastes can be recycled or can be considered to have value based on recovery of various elements, such as metal recovery.
- Transport off-island: Waste disposal sites are located in the region that may be able to receive the hazardous waste generated.
- Construction of an engineered disposal cell: This cell should be impermeable and could be located in the existing landfill site on the island.

The advantages and disadvantages of these options can be considered in more detail upon classification and identification of actual volumes of waste produced.

Based on the lack of a physical framework in Barbados to deal with the disposal of industrial wastes, appropriate technological solutions can be implemented. The following are examples of appropriate disposal practices for the commonly encountered plant wastes:

1. Oily sludges, such as those accumulating over time on tank bottoms, which cannot be burned in the incinerator or boilers or otherwise acceptably disposed, will be drained to remove as much free oil as possible and allowed to weather before disposal. Such wastes will be mixed with marl before disposal at landfill.

2. Oil-soaked soils, such as those resulting from spills, will be allowed to weather on an impermeable surface before disposal to landfill. These will be left to allow the natural soil bacteria to consume (bio-remediate) the hydrocarbons. Periodic turning of the soil pile will be done to optimize the process.

3. The majority of the liquid wastes produced are either used oils or contaminated fuels that can be incinerated on site or burned in the steam boilers at Spring Garden.

4. Boiler wash water will be adjusted to a pH > 8.5 prior to disposal. The surplus liquid will be decanted carefully to reduce solids carryover. The disposal of waste sludge will be coordinated with government approval.

5. Records will be kept of liquid waste shipments leaving the site including type of waste, quantity (number of drums) and disposal location.

6. Non-routine liquid wastes will be tested to confirm an acceptable disposal method.

7. The amounts of waste chemicals requiring disposal will be minimised where possible.

8. The MSDS of waste chemicals will be reviewed for safe disposal recommendations.

9. Surplus chemicals will be returned to the supplier where possible or provided to another user.

2.8 Fuel oil pipeline and oil receiving

The pipeline will be designed and operated such that the potential for leaks is highly improbable. However, the prevention of impacts from third parties is very important. The following preventative measures will be followed:

1. As a precautionary measure a pipeline right-of-way inspection and maintenance program will be performed on a routine basis. Weekly patrols along the right-of-way will identify any potential construction activities that could affect the pipeline. These inspections will also reveal any areas of instability that may occur, such as loss of cover alongside a road after a severe rainstorm.
2. The integrity program for the pipelines will be developed according to pipeline maintenance specifications and will be incorporated into a specifically designed maintenance-training program.
3. In the event of a leak the pipeline will be shut down immediately, the location determined and the Spill Contingency Plan activated. The extent of contamination will be determined and a program of remediation provided according to the following steps:
    a. A program of strategically placed test pits or boreholes along with monitoring wells can determine the extent of contamination.
    b. The results of the sampling program will assist in determining the extent and severity of the contamination.
    c. Based on the findings of the intrusive sampling program involving test pits, a remediation program can be established.

During oil receiving it is extremely important that spills to the sea are avoided. The following preventable measures will be provided:

1. As a precautionary measure the ship will be surrounded by a continuous floating boom prior to offloading of fuel oil.
2. There will be one person on the wharf with radio contact to the ship during off loading to identify any spills.
3. All fuel transfers will cease in the event of a spill and the Spill Contingency Plan will be activated.

3.0 IMPLEMENTATION AND OPERATION

3.1 Responsibilities

3.1.1 Generation Manager

The Generation Manager will bear overall accountability for ensuring that the environmental management program is in effect and adequately resourced.

3.1.2 Safety, Health and Environmental Coordinator

The Safety, Health and Environmental Coordinator will have responsibility for implementing the programs for the environmental management of the power plant. The following functions are required to fulfil this responsibility:

a) Coordinate all safety, health and environmental management functions.

b) Report on safety, health and environmental matters to the plant management.

c) Monitor compliance with relevant safety, health and environmental standards.

d) Act as a spokesperson on safety, health and environmental issues.

3.1.3 Other Staff

All staff will have a responsibility to be aware of and to comply with the corporate safety, health and environmental management procedures.

3.2 Procedures

3.2.1 Standards

It is the policy of The Barbados Light & Power Company Limited to comply with all the Laws of Barbados. Where specific laws, regulations, and guidelines addressing particular procedures, processes and practices exist, these will be adhered to. In some instances, these may establish only minimum standards, and it might be more appropriate for the Company to adopt more stringent standards, which are in force internationally. In the absence of any laws or regulations being in force in Barbados, the most practical, technologically appropriate and cost effective international standards shall be adopted.

3.2.2 Operational Procedures

1. The Company will implement procedures for ensuring compliance with Company policy and agreed environmental standards. A compliance monitoring record shall be included in the Company's files.

2. Environmental Audits of the operations shall be conducted by suitably qualified BLPC personnel annually (see also Section 4.2.1).

3. In those areas of our operations where there is a risk of significant unplanned events occurring, such as "fuel spills", appropriate systems will be put in place to minimize such risk. These systems will form part of the Company's Contingency and Emergency Plans.

4. In all instances where the Company is planning the installation of major new facilities or equipment which could generate significant environmental impacts, an environmental study of the effects shall be conducted.

5. Records shall be maintained of the costs associated with environmental works, including audits, studies, EIAs, and any remedial and mitigative measures taken.

3.3 Emergency Preparedness

Despite the best efforts of operating staff, unexpected incidents can arise as a result of accidents, equipment failures or “Acts of God”. To manage such incidents, Contingency Plans are developed that describe the framework of a response and provide information on the resources available to meet the incident (contractors, available equipment etc.). The environmental risks for the Trents Generating Station include:

- Spills of oil and chemicals; and
- Fires.

3.3.1 Spills

The most serious environmental concern of a spill at the Trents Generating Station is if it enters the groundwater or leaves the site. This is generally more relevant for spills of fuel oil due to the potential quantities that can be involved. The Generation Manager and the Safety, Health and Environmental Coordinator should be immediately informed of spills that have the potential to leave the site. Spills should be prevented from entering drains, if possible. If the source of the spill can be safely stopped, this should be done to reduce impacts.

To respond effectively to oil spills, the Company has developed a Spill Contingency Plan for its generation operations that details the response, cleanup, reporting and responsibilities. The

Spill Contingency Plan should be updated at the time of commissioning to ensure that it fully meets the design and operating conditions.

3.3.2 Fires

A Fire Plan has been established within BLPC and this should be referenced for detailed activities related to incidents involving fires.

3.4 Environmental Training Programs

Appropriate training and familiarization of plant personnel will help ensure that environmental regulations are followed and corporate requirements are met. Appropriate operating staff shall be informed of the project environmental requirements during their initial employee orientation. The following training will be provided as required:

1. All employees who handle chemicals should have training in their safe use and any dangers relating to fire, reactions, etc.

2. The environmental coordinator and other members of the spill response team should have training through BNRT.

3. The Safety, Health and Environmental Coordinator will have basic awareness training in wastewater treatment, air emissions management, waste management, noise and environmental auditing.

4.0 PERFORMANCE MONITORING

4.1 Monitoring Programs

The Company will fulfill all of the compliance monitoring requirements of the site approval. In addition to the regulatory requirements of approval, the Company will complete monitoring programs as described in Section 2 of this EMP as follows:

1. Air emissions monitoring as per Section 2.3.2.
2. Noise emissions monitoring as per Section 2.4.2.
3. Wastewater monitoring as per Section 2.5.2.

4.2 Inspections

Daily checks of the plant environmental systems will be completed including the oil water separator and treatment system, the CEMs, and the precipitator system.

All environmental control equipment will be maintained and checked in accordance with the manufacturers instructions.

4.2.1 Environmental Audits

Suitably qualified external consultants shall conduct environmental audits of the operations at least every three (3) years. This will ensure a consistent environmental management program for the site.

An **Environmental Audit** is an objective evaluation of how well an organization's management and equipment is performing in meeting the goal of safeguarding the environment. It facilitates management control of environmental policies and provides an assessment of compliance with company policies and regulatory requirements. The purpose of the Environmental Audit is to:

1. Identify key impacts of the Company's business on the environment.
2. Provide a true and factual assessment of the Company's operations with regard to environmental matters.
3. Document the environmental status of the Company's operations.
4. Act as a feedback mechanism to determine where improvements are required (e.g., poor operating and maintenance practices, opportunities for cost reduction and improvements).

5. Avoid surprises by identifying areas of a sensitive nature which are potentially damaging to the Company's public image.

6. Identify risk exposures with regard to environmental issues.

7. Improve employee awareness with regard to environmental issues.

The auditors conducting the work shall be selected so as to ensure the objectivity and impartiality of the audit. The Auditors shall be guided in their work by National Governmental and International Standards as well as Company Policy. The Auditors should be familiar with industry standards and practices relating to electric utilities.

Key audit activities include:

1. Pre-audit activities:
   i. Select team members for audit;
   ii. Schedule dates for audit;
   iii. Plan audit (scope, priority topics, resources, communications);
   iv. Request information in advance to expedite the audit;

2. Field Work:
   v. Conduct physical survey of facilities;
   vi. Examine a sample of environmental, administrative, technical, and operating records;
   vii. Conduct interviews with key management and staff;
   viii. Implement verification procedures for ensuring adherence to laws, regulations, and procedures;

3. Post-audit activity:
   ix. Prepare draft final report and review of same;
   x. Issue Final Report;
   xi. Develop Action Plan (Corrective action, assign responsibilities, timetable); and
   xii. Implement follow-up to ensure actions being implemented.

4.3 Documentation

For operations and maintenance of the power plant, the following environmental records and information will be maintained:

1. Information on applicable environmental legislation and regulations;
2. Environmental approvals and/or permits;
3. Inspection reports and operator log;
4. Maintenance reports and action undertaken;
5. Incident reports and action undertaken;
6. Training records;
7. Complaint records and response;
8. Pertinent contractor agreements/contracts and information;
9. Information on emergency preparedness and response;
10. Records of significant environmental impacts;
11. Internal/external audit results and details of non-compliance; and
12. Management review.

5.0 MANAGEMENT REVIEW

To enable continual improvement and to ensure effective implementation of the Environmental Management Plan, BLPC management will annually review the plan. The first review will include a comprehensive examination of all the elements in the EMP.

After the first review period, it is expected that not all elements of the EMP will require a comprehensive review every year, as some elements, due to their nature, may not significantly change.

Key information to be reviewed by BLPC management include:

1. Results of the internal monitoring / environmental audits;
2. Level of compliance with environmental legislation;
3. Extent of which environmental objectives and targets that have been achieved;
4. Concerns of relevant external agencies and parties; and
5. Means for improving performance.

To facilitate a continual improvement process, the conclusions and recommendations from the management review will be documented to identify areas that require corrective action and for the purpose of identifying opportunities to improve the Environmental Management Plan.

5.1 Environmental Reporting

The Company will implement procedures for preparing an annual environmental report covering the results of monitoring with the agreed environmental standards. A compliance record will be included in the Company's files.

The Company will also develop a procedure for handling and recording environmental incidents and near misses. This will include the response and follow up to complaints, an investigation of the root cause and recommendations to prevent reoccurrence.