

**BAHAMAS ELECTRICITY CORPORATION  
ENVIRONMENTAL MANAGEMENT SYSTEM**

**FINAL REPORT**

**MSc**

**November 1994**

**M R Hornsby BSc,**

**CEng, M.I. Mech.E  
Manager  
Power Development Division**

**For and on behalf of**

**Mott Ewbank Preece  
Victory House  
Trafalgar Place  
Brighton  
BN1 4FY  
United Kingdom**

# ENVIRONMENTAL MANAGEMENT SYSTEM

## TABLE OF CONTENTS

SECTION NO.		PAGE
	EXECUTIVE SUMMARY	
1.	ENVIRONMENTAL MANAGEMENT SYSTEM OUTLINE	
1.1	Introduction	1/1
1.2	Operational	1/1
1.2.1	Atmospheric Emissions	1/1
1.2.2	Fuel	1/2
1.2.3	Waste Disposal	1/2
1.2.4	Waste Fuel and Lube Oil	1/2
1.2.5	Maintenance	1/2
1.2.6	Noise	1/2
1.2.7	Water	1/3
1.2.8	Housekeeping	1/3
1.2.9	Distribution	1/3
1.2.10	Decommissioned sites	1/4
1.2.11	Chemicals Purchasing	1/4
1.2.12	Environmental Incident Reporting	1/4
1.3	Non-Operational	1/4
1.3.1	Office Related	1/4
1.3.2	Procurement	1/4
1.3.3	Staff Related	1/5
1.3.4	New Projects	1/5
1.3.5	Public Relations	1/5
1.3.6	Energy Efficiency	1/6
1.4	Environmental Action Plans	1/6
1.5	Annual Environmental Review	1/6
1.6	Annual Audit	1/7
1.7	Responsibilities	1/7
1.8	Units Standardisation	1/7
2.	ENVIRONMENTAL MANAGEMENT INSTRUCTIONS - OPERATIONAL	
2.1	Background	2/1
2.2	Environmental Management Instructions	2/2

<b>SECTION NO.</b>		<b>PAGE</b>
3.	ENVIRONMENTAL MANAGEMENT INSTRUCTIONS - NON-OPERATIONAL	
3.1	Background	3/1
3.2	Environmental Management Instructions	3/1
4.	ENVIRONMENTAL MANAGEMENT INSTRUCTIONS - EXTERNAL	
4.1	Background	4/1
4.2	Environmental Management Instructions	4/1
5.	ENVIRONMENTAL MANAGEMENT INSTRUCTIONS - ANNUAL REVIEW	
5.1	Background	5/1
5.2	Environmental Management Instructions	5/1
6.	TERMS OF REFERENCE FOR EXTERNAL AUDIT	
6.1	Scope of Work	6/1
6.2	Depth of Involvement	6/1
6.3	Deliverables	6/1
6.4	Reviewers Pre-requisites	6/2
6.5	Method of Approach	6/2
6.6	Time Required and Programme	6/2
6.7	BEC Contact	6/2
6.8	Costs/Fees	6/3
6.9	Report Submission	6/3
 APPENDIX		
A.	BEC Environmental Policy	
B.	Proposed Standard Units for Measurements	
C.	Some General in Formation on "Duty of Care"	

## **ENVIRONMENTAL MANAGEMENT SYSTEM**

### **EXECUTIVE SUMMARY**

The document outlines Bahamas Electricity Corporations (BEC) Initial Environmental Management System (EMS), with the major aim being to demonstrate compliance with the Corporate Environmental Policy.

Within this system, we have identified a number of procedures and for each procedure, we have outlined the necessary environmental management instruction required to implement that procedure.

The procedures with this EMS have been divided into the following categories:

- Operational activities
- Non-operational activities
- External activities

In addition, environmental management instructions are also presented for an annual review. We have also included Terms of Reference for an external audit in order to verify BEC's Environmental Performance against targets.

## **SECTION 1**

### **ENVIRONMENTAL MANAGEMENT INSTRUCTIONS - SYSTEM OUTLINE**

#### **1.1 INTRODUCTION**

This document outlines Bahamas Electricity Corporation's (BEC) initial Environmental Management System which Ewbank Preece (EP) have proposed and shows the main areas where procedures are expected to be implemented. Also identified in this outline system are the anticipated management responsibilities for implementation.

The general approach splits the systems between the operational (electricity generating and distribution side) and non-operational (headquarters and corporate functions) parts of the business. It is expected that this system will gradually be built up to cover all areas of BEC's business. However, during the initial stages it is anticipated that the generating sites will receive the greater attention because their immediate impact on the environment is greater, as shown in the environmental review.

The initial priority is to set up data collection systems in order to prioritise areas where improvements can reasonably be made in the future. However, the system for implementing improvements will include the first year targets which have been determined as a result of the initial environmental review carried out by Ewbank Preece. The aim is to demonstrate compliance with the Corporate Environmental Policy, which will be adopted by the Board. A draft Policy is attached in Appendix I.

In each section the subject of the system, e.g. emissions or housekeeping, will be briefly described.

#### **1.2 OPERATIONAL**

##### **1.2.1 Atmospheric Emissions**

A system has been formulated for setting up an emissions inventory for all power stations and setting targets for future improvements. A more detailed system will be developed for Clifton Pier Power Station (CPPS) to tie in with the air quality data and other factors associated with the site.

**Responsibility: S&E (Safety and Environment Manager)**

##### **1.2.2 Fuel**

Procedures for purchasing fuel which take into account the environmental aspects has been established. In addition responsibilities have been identified for controlling fuel delivery and storage to minimise spillage and ensure that metering of fuel delivered and used is recorded. Areas of fuel handling where emergency procedures and clean up facilities are desirable have also been identified.

**Responsibility: Fuels and Performance Manager**

### **1.2.3 Waste Disposal**

A system has been outlined for determining the quantities of different solid waste materials disposed of at each site. It will promote the minimisation of waste production, and the use of satisfactory disposal routes where recycling is not possible.

**Responsibility: Site Managers**

### **1.2.4 Waste Fuel and Lube Oil**

A waste oil management procedure has been set up to record the quantities generated by each site and the storage and disposal method used. The information will be collected by each site manager and collated by the Safety and Environment Manager. A general guide procedure has been drafted for sites to adopt, and the procedure covers a number of different disposal options.

**Responsibility: Site Managers/S&E**

### **1.2.5 Maintenance**

A system has been set up which logs, on a site by site basis, scheduled and unscheduled maintenance carried out during the year which may have affected, either on a temporary or permanent basis, releases to air, water or land. Justification will be required for any changes in the consumption rate of lube oil from an initial base level.

**Responsibility: Site Managers**

### **1.2.6 Noise**

For each location a review procedure has been set up for monitoring site boundary noise levels on a basis consistent with the sensitivity of the location. This generally covers all the generating sites but a number of substation sites are also be included. In addition, reference is also required to be made to the monitoring of occupational noise levels which will be standardised where possible. The procedure will require regular monitoring inside operational buildings as already carried out as part of BEC's safety programme.

**Responsibility: S&E**

### **1.2.7 Water**

Procedures have been proposed to ensure that process water usage is minimised as far as possible and that water discharged, both process water and surface water, is not harmful to the local environment. Where necessary, the monitoring of groundwater sources will be performed on a regular basis.

**Responsibility: Site Managers/S&E**

### **1.2.8 Housekeeping**

Some general principles on site housekeeping have been proposed for Station Managers to follow on a regular e.g. monthly basis. This includes techniques for recording site performance and a requirement for spot checks from the Environmental Officer.

The location of asbestos and contaminated land/oil clean up are being dealt with under existing procedures but will be cross referenced here.

**Responsibility: Site Managers/S&E**

### **1.2.9 Distribution**

A broadly based management procedure has been developed covering the distribution system. It covers such issues as:-

- use of non-rain forest wood for the poles
- use of environmentally friendly wood treatment
- use of non-polychlorinated biphenols transformer oils and determination of current polychlorinated biphenols (PCB) levels both by test kit and by an external lab.
- Recycling of transformer oil
- minimising disturbance during installation and maintenance including the use of chemicals.
- Recording quantities of waste materials.

**Responsibility: New Providence Distribution Manager/S&E  
Family Island Distribution Managers/S&E**

**1.2.10 Decommissioned Sites**

A system has been established for recording and reviewing the status of sites previously used for either electricity generating or as a substation.

**Responsibility: Site Managers**

**1.2.11 Chemicals Purchasing**

The use of water additives and cleaning fluids that are environmentally friendly will be promoted where they are readily available. Chemicals storage will also be addressed.

**Responsibility: Purchasing and Stores Manager/S&E/All Staff**

**1.2.12 Environmental Incident Reporting**

A formal procedure for recording and reporting internally any environmental incident has been set up. The Site Manager will be responsible for reporting such incidents and remedial action taken.

**Responsibility: Site Manager**

**1.3 NON-OPERATIONAL**

**1.3.1 Office Related**

A system has been set up for monitoring the Headquarter and other office working environments to minimise energy and water consumption and control waste production where possible. This procedure will interface with future procurement requirements.

**Responsibility: Engineering Manager**

**1.3.2 Procurement**

Procedures for procurement of goods and services will require environmental aspects to be considered and balanced against cost. This will include:-

- the use of contractors committed to minimising environmental damage
- the use of low energy electrical fittings where possible
- the use of environmentally friendly products e.g. bleaching agents, water treatment chemicals, cleaning fluids
- company cars which are no worse on fuel consumption than the car they are replacing.

**Responsibility: Purchasing and Stores Manager/All Staff/S&E**

### **1.3.3 Staff Related**

An internal system has been set up to promote environmental awareness amongst all staff and encourage environmentally friendly behaviour both on a local and corporate basis. This may include:

- encouraging sharing lifts to work or using Public Transport
- minimising waste production
- requesting the use of environmentally friendly goods
- encourage staff input
- job specific training.

**Responsibility: Public Relations/S&E**

### **1.3.4 New Projects**

For any new project or plant upgrade, a system has been set up to ensure that the environmental performance of the proposed plant or equipment will have an environmental overview whether internal or external. In some cases a full environmental assessment may be recommended along with "Best Available Technology" concept.

Any consultant or contractor employed by BEC will be required to demonstrate that they can achieve environmental standards that are satisfactory to BEC. The procedures for this process are brief as it is usually a condition of any long agreement.

**Responsibility: Construction Contractors/S&E**

### **1.3.5 Public Relations**

Procedures have been set up to formally record and respond to any public complaint as well as being proactive in promoting BEC's environmental image. This could be extended to becoming corporate members of environmental institutions.

**Responsibility: S&E/Public Relations**

### **1.3.6 Energy Efficiency**

A system has been set up which records BEC's programme to inform its customers and staff about the benefits of using energy more efficiently and carries out market research to test its effectiveness.

**Responsibility: Public Relations/System Development/S&E**

## **1.4 ENVIRONMENTAL ACTION PLANS**

In accordance with a set of corporate environmental targets, the individual Executive Committee Member will, in consultation with the Safety and Environment Manager, agree with individual managers responsible for both operational and corporate functions, an agreed set of targets to achieve each year including a budget for environmental improvements.

Targets will not necessarily require all managers to make new initiatives every year but may set the target to maintain the standards of the previous year. However, in order to maintain continuous improvements in BEC as a whole, some new systems have been introduced and in some cases lower targets need to be agreed each year. It is also envisaged that a proportion of the annual budget will be allocated on an annual basis for expenditure on environmental improvement.

It is anticipated that the first year will concentrate mainly on:

- satisfying the requirements of the IADB
- developing the BEC Environmental Protection Office
- agreeing a Corporate Environmental Policy
- setting up the main reporting procedures for all releases to the environment on the operations site
- ensuring any major new projects have considered the "environment"
- developing an action plan to implement any mitigatory measures recommended in the environmental review.
- actively promoting environmental awareness amongst all staff both in general and job specific.

**Responsibility: Executive Committee/S&E**

## **1.5 ANNUAL ENVIRONMENTAL REVIEW**

The Safety and Environment Manager responsible for collating the annual environmental review which it is anticipated will initially be issued in BEC's corporate annual report. This review will:

- review progress against the Corporate Environmental Policy
- assess compliance with any legislation
- review environmental performance against agreed targets
- present the targets for the coming year

- present BEC's environmental performance to the Public

A provisional target date for the first full review would be for the financial year ending September 1995. Eventually a separate review may be issued with a summary in the annual report.

**Responsibility: S&E/Executive Committee**

## **1.6 ANNUAL AUDIT**

The Environment and Safety Manager, with the approval of the General Manager, will arrange for an independent annual audit of BEC's environmental performance. The consultants engaged to carry out the audit will check that the Policy objectives have been met, that data collection are representative, ensure that it has been reported in a fair way and make recommendations for areas where improvements might be made in both the collecting and reporting of environmental data. The audit will also identify areas where BEC could improve their environmental performance.

The draft scope of work for the annual audit is included as one of the procedures in the initial EMS although the first audit is not expected to be before the end of 1995. It is expected that the audit would take about 100 manhours to carry out.

**Responsibility: S&E**

## **1.7 RESPONSIBILITIES**

The General Manager will have overall responsibility for ensuring that environmental targets are met and that BEC is complying with all legislation and their adopted environmental policy. Progress reported regularly by the manager responsible to the Executive Committee.

The Safety and Environment Manager responsible for advising individual managers on environmental matters, ensuring data is reported and internally audited. He will also maintain his own independent environmental database for reporting purposes.

## **1.8 UNITS STANDARDISATION**

So as to facilitate a satisfactory environmental database, a set of units for reporting details has been defined, see Appendix II. These will not necessarily be SI units but those most commonly used by BEC.

## **SECTION 2**

### **ENVIRONMENTAL MANAGEMENT INSTRUCTIONS - OPERATIONAL**

#### **2.1 BACKGROUND**

In this section, we have included a number of procedures associated with operational aspects of BEC's power generation activities. These procedures include:

- Inventory of SO<sub>2</sub>, NO<sub>x</sub> and CO<sub>2</sub>
- Clifton Pier Air Quality Review
- Fuel Purchasing Procedures
- Fuel Delivery and Storage Records
- Fuel Inventory
- General Waste Disposal
- Waste Oil Production Records
- Station Maintenance Records
- Noise Control at Operational Sites
- Water Effluent Management
- Site Housekeeping
- Distribution/Transmission Maintenance
- Staff Environmental Awareness
- General Waste Oil Disposal Procedure
- Control of Chemicals
- Environmental Incident Reporting.

#### **2.2 ENVIRONMENTAL MANAGEMENT INSTRUCTIONS**

These are provided in the following pages for each of the above operational procedures. These procedures have been numbered for identification purposes with OP1 representing Procedure Number 1 under Operational activities.

**BAHAMAS ELECTRICITY CORPORATION**  
**ENVIRONMENTAL MANAGEMENT INSTRUCTION**

**OP1: INVENTORY OF SO<sub>2</sub>, NO<sub>x</sub> AND CO<sub>2</sub>**

**Emissions Inventory**

An Emissions Inventory is a database which records on a monthly/annual basis emission rates and quantities of pollutants from operating power stations based on fuel burn, MWhs generated and measured emissions concentrations. This allows annual targets to be set in terms of g/kWh of pollutants for SO<sub>2</sub>, NO<sub>x</sub> and CO<sub>2</sub>.

**Areas of Application**

The emissions inventory will be required for all plant burning fuel to generate electricity and will require reporting on a monthly basis of fuel burnt and MWh to be sent to the Environment Protection Office who will maintain the database and carry out regular checks on emissions. These data together with the fuel carbon content will give annual tonnages and g/kWh for NO<sub>x</sub>, SO<sub>2</sub> and CO<sub>2</sub>.

**Responsibilities**

The Station Manager, or a delegated person, will be responsible for filling in the data sheets for their operating plant on a monthly basis and sending it to the Environment Protection Office. The Environment Protection Office will then collate the information and be responsible for notifying the manager if the emission rate, as measured in g/kWh, increases significantly and will also be responsible for carrying out stack measurements at all operating plant for which Site Managers will provide any necessary back-up.

**Frequency of Review**

The Environment Protection Office will carry out emission checks and complete Emission Inventory Data Sheet No. 1 at least on the following frequency:

- (1) New Providence - twice per year
- (2) Family Islands - once every two years

Emission Inventory data sheet No. 2 will be completed and returned every month by the Site Manager responsible.

## EMISSIONS INVENTORY DATA SHEETS

### 1. STACK CONCENTRATION CHECK

STATION:				
LOCATION:				
DATE OF MEASUREMENT:				
ENVIRONMENTAL ENGINEER:				
<b>Temp</b> <b>NOx</b> <b>SO<sub>2</sub></b> <b>O<sub>2</sub></b> <b>°C</b> <b>mg/m<sup>3</sup></b> <b>mg/m<sup>3</sup></b> <b>%</b>				
Unit 1				
Unit 2				
Unit 3				
Unit n				
Signed: (Station Manager)				
Signed: (Env Engineer)				



**BAHAMAS ELECTRICITY CORPORATION**  
**ENVIRONMENTAL MANAGEMENT INSTRUCTION**

**OP2: CLIFTON PIER AIR QUALITY REVIEW**

**Air Quality Review**

As the principal generating station in BEC, the ambient air quality around the station is a key environmental issue which needs formally reviewing on a regular basis.

**Areas of Application**

Air quality data, plant emission data, public complaints and other pollution sources will be continually appraised in order to ensure that Clifton Pier PS is not causing any significant environmental impact. This will include:-

- (1) Reviewing on a monthly basis, including presenting monthly concentration averages, the DEHS Data to confirm the voluntary air quality standards have been met and no significant increases have arisen.
- (2) Check station emissions are within specification by using the station log and confirm emission monitoring equipment working (using attached check sheet).
- (3) Review any public complaints and assess any correlation with all potential pollution sources and meteorological data.

**Responsibility**

The Clifton Pier air quality review will be the responsibility of the Safety and Environment Manager who will provide a quarterly report summarising the areas air quality. Any breaches of emissions or air quality standards will be reported direct to the Station Manager and any remedial action deemed necessary, including implementation timescales, agreed and logged.

The Station Manager will be responsible for ensuring that the environmental log sheets are completed, including instrument calibration checks and returned to the Environmental Protection Office each week.

**Frequency of Reporting**

Data will be reviewed on a continuous basis with a quarterly report produced summarising all relevant information. The September 1995 report will include a review of the whole year and compare results with previous years data.

## CLIFTON PIER POWER STATION

### SHIFT CHARGE ENGINEERS ENVIROMENTAL LOG

This form should be completed by the Shift Charge Engineer during each shift, submitted to the Station Manager each morning with a copy to the Safety Department.

<b>SHIFT</b>	8.00am-4.00pm	4.00pm-12.00mn	12.00mn-8.00am
Chief Engineer's Name:			
Date:			
Time:			
DA/9 Output: MW(e)			
NOx (ppm):			
CO (ppm):			
O <sub>2</sub> (%O <sub>2</sub> ):			
DA/10 Output: MW(e)			
NOx (ppm):			
CO (ppm):			
O <sub>2</sub> (%O <sub>2</sub> ):			
Incinerator on: Y/N			
Others unit in operation:			
Wind Speed: (Calm/light/moderate/strong)			
Wind Direction			
Dump burning: Y/N			
Date of last calibrations:			
Signed: Charge Engineer:			
Station Manager _____			
Date _____			

**BAHAMAS ELECTRICITY CORPORATION**  
**ENVIRONMENTAL MANAGEMENT INSTRUCTION**

**OP3: FUEL PURCHASING PROCEDURES**

**Fuel Purchasing**

Fuel quality has a major impact on pollution levels resulting from its use in generating electricity.

**Areas of Application**

The fuel specification in terms of sulphur content should be continually reviewed along with the potential cost to BEC of moving to a low sulphur, low asphaltene, level. This mainly applies to heavy fuel oil (HFO). An annual report will be produced and copied to the Environment Protection Office summarising the oil price variation with sulphur content (and asphaltene levels) over the previous year both for supplies available in BEC and on the world market. If there is no cost penalty for tightening the specification this will be lowered at the earliest opportunity.

**Responsibility**

This will be the responsibility of the Fuels and Performance Manager

**BAHAMAS ELECTRICITY CORPORATION**  
**ENVIRONMENTAL MANAGEMENT INSTRUCTION**  
**OP4: FUEL DELIVERY AND STORAGE RECORDS**

**Fuel Delivery and Storage Records**

Records will be kept detailing quantities of fuel, quality analysis (including occasional independent checks), date of delivery and storage tank used for all fuel deliveries.

**Areas of Application**

Fuel delivery and storage records will be kept at all operational sites as a first stage of the fuel inventory. The record will be as per the attached pro-forma and will be signed off both by a site-representative of BEC and the fuel supplier. Random heavy fuel oil samples will also be taken for analysis for calorific value, sulphur, ash, asphaltenes and compatibility. Five samples will be taken each year for New Providence and at least one sample per year for each Family Island.

**Responsibility**

It will be the Fuel and Performance manager's responsibility to ensure that the records are properly kept and each fuel analysis copied to the Safety and Environment Manager. The Environment Protection Office will inspect the site records on a regular basis, annually for New Providence and every 3 years on the Family Islands.

The Fuel and Performance Manager will be responsible for ensuring the fuel samples are taken of the "as delivered" fuel, and sent away for analysis. The results will be copied to the Environmental Protection Office.

## FUEL DELIVERY RECORDS

DATE:		
LOCATION	:	
FUEL TYPE	:	TONS
QUANTITY DELIVERED	:	
QUANTITY VERIFIED	:	Y/N
SUPPLIER	:	
QUALITY CERTIFICATE SUPPLIED	:	Y/N
COPY SENT TO S&E MANAGER	:	Y/N
FUEL WITHIN SPECIFICATION	:	Y/N
SPILLAGES	:	Y/N
IF YES THEN STATE		
APPROXIMATE QUANTITIES	:	US GALLONS
STORAGE TANK USED	:	
 <b>Signed</b>		
Site Engineer:		
 Site Manager:		
 Date:		
 Fuel Supplier:		

**BAHAMAS ELECTRICITY CORPORATION**  
**ENVIRONMENTAL MANAGEMENT INSTRUCTION**

**OP5: FUEL INVENTORY**

**Fuel Inventory**

The fuel inventory will be designed to ensure that the total fuel delivered, transferred to day tanks and burnt in the electricity generating units balances to check that no fuel has been "lost" through leakages. This will properly document fuel usage and create an audit trail.

**Area of Application**

A Fuel Inventory will apply to all stations burning fuel but will be more complex for the plant on New Providence where it is anticipated that the following will be recorded by meters placed at the appropriate points:

- (1) Quantity of fuel delivered to bulk storage (both HFO and ADO).
- (2) Quantity of HFO fuel sent to Clifton Pier day tank.
- (3) Quantity of HFO consumed in Clifton Pier engines (accounting for HFO treatment)
- (4) Quantity of ADO consumed in Clifton Pier PS and incinerator
- (5) Quantity of ADO sent to Blue Hills PS
- (6) Quantity of ADO received at Blue Hills PS
- (7) Quantity of ADO consumed at Blue Hills PS
- (8) Tank level indication at both sites
- (9) Records of meter maintenance and calibration checks.

By using the above data, a mass balance of fuel delivered and consumed will be established and enable BEC to monitor for any loss on a weekly basis. For the Family Islands stations where there are generally no underground pipelines the quantity of fuel delivered and consumed in each station will be recorded and logged on a monthly basis.

**Responsibility**

The Station Manager and the Fuels and Performance Manager will be responsible for ensuring that the fuel delivered balances with the fuel consumed and the reports copied to the Environmental Protection Office and the Fuels and Performance Manager. Any disparities will be immediately documented and an action plan developed by the Fuels and Performance Manager to rectify any problem identified.

### **Frequency of Reporting**

The Manager, Fuels and Purchasing, will produce an annual report which will be copied to the Environment Protection Office.

**BAHAMAS ELECTRICITY CORPORATION**  
**ENVIRONMENTAL MANAGEMENT INSTRUCTION**

**OP6: GENERAL WASTE DISPOSAL**

**General Waste**

General waste will be defined as any solid or liquid product which is not required for reuse, incineration special disposal or other purposes and is scheduled for disposal at the local waste dump.

**Areas of Application**

The control of waste disposal will apply to all sites that produce waste including generating, office and transmission/distribution locations. It is envisaged that the system will be based on the UK's "Duty of Care" procedures. Some general information on "Duty of Care" is provided in Appendix III.

The quantities and general waste description will be recorded for each consignment along with the transport company engaged and the site at which the waste is disposed. Documented evidence, if available, that both these are competent operators will be obtained by the responsible manager. This will be recorded in a waste disposal log book for the site as in the attached proforma.

On an annual basis, the potential for reducing waste quantities will be reviewed by each responsible manager demonstrating that options for recycling and minimising or eliminating solid waste have been considered.

**Responsibility**

Each Manager responsible for the operation that generates the waste will ensure that waste disposal records are maintained. The Environment Protection Office will check on a regular basis, e.g. twice each year, that records are a true record of the waste disposed and verify that the waste has reached the stated destination and disposed of in a satisfactory manner.

**Exclusions**

These procedures do not apply to the disposal of special wastes such as asbestos, PCBs or toxic chemicals. Other specialist disposal procedures will apply to these and will need to be set-up in the future.

## WASTE SHIPMENT AND DISPOSAL NOTE

Note Number	:	Site/Operator/Number
Waste Type (general office, general construction, general metal, others)	:	
Quantity (tons)	:	
Container Type	:	
Date collected	:	
Date taken off-site	:	
Transport Operator	:	
Disposal Site	:	
Quantity Received at Landfill (tons)	:	
BEC Authorisation		

**BAHAMAS ELECTRICITY CORPORATION**  
**ENVIRONMENTAL MANAGEMENT INSTRUCTION**  
**OP7: WASTE OIL PRODUCTION RECORDS**

**Waste Oil**

Waste oil is any oil product, fuel, lubricating or transformer, which is no longer required and is likely to have been contaminated during normal use. Different oils will require different disposal methods and/or treatment/recycling. Records will be made of waste oil quantities produced and the disposal route expected to be used.

**Areas of Application**

There are three distinct areas where waste oil production records are required. These are:

- (a) Fuel oil sludge from HFO treatment
- (b) Lubricating oil
- (c) Transformer oil.

HFO sludge is only produced at Clifton Pier PS and is incinerated. Lubricating oil is collected, stored in drums on site and some incinerated at Clifton Pier PS. Transformer oil is collected, stored and some is recycled where possible and is covered in another procedure. On New Providence the option for incineration is more readily available through the incinerator at Clifton Pier PS.

For each type of waste oil, records should be made as per the attached proforma which shows the type, quantity and origin of the waste oil. This will also record the expected disposal route or storage location for the waste oil.

**Responsibility**

It will be the responsibility of the Site Manager to ensure that the waste oil production and disposal/storage records are maintained up to date. The Safety and Environment Manager will ensure that the records are checked on a regular basis.

**Frequency**

Storage records will be reviewed on a monthly basis to ensure that the storage drums have maintained their integrity and that all drums are clearly labelled and logged. The records will be checked by the Environment Protection Office on a six monthly basis on New Providence and ever 2-3 years on the Family Islands.

## WASTE OIL PRODUCTION RECORD

Station:

Record No.

Date:

Oil Type:

Quantity:

Special Contamination:

Storage Vessel:

Disposal Method Expected:

Checked by:

Date:

**BAHAMAS ELECTRICITY CORPORATION**  
**ENVIRONMENTAL MANAGEMENT INSTRUCTION**  
**OP8 :STATION MAINTENANCE RECORDS**

**Station Maintenance**

Routine maintenance does affect the environmental performance of power plant and separate records will be maintained which log major maintenance jobs that affect this aspect that might then be correlated with other environmental data.

**Areas of Application**

Station maintenance by its very nature applies to the whole of the power plant operations. However, only the major areas that affect the station environmental performance should be briefly recorded in the Environmentally Related Maintenance Log. This would probably include:

- (i) Engine efficiency related work
- (ii) Lube oil consumption rate alterations
- (iii) Fuel tank cleaning
- (iv) Stack monitoring kit (CPPS)
- (v) Boiler cleaning.

**Responsibility**

The Log will be generated in the attached proforma on a monthly basis by the plant maintenance engineer and checked by the Station Manager and copied to the Environment Protection Office who will use the information to correlate with changes in plant environmental performance.

## STATION MAINTENANCE RECORDS

Station:

Month:

Maintenance Carried out:

Unit No.:

Nature of work:

Waste produced:

Any spillages:

Changes in Environmental Performance:

Signed:

Date:

Checked:

**BAHAMAS ELECTRICITY CORPORATION**  
**ENVIRONMENTAL MANAGEMENT INSTRUCTION**  
**OP9: NOISE CONTROL AT OPERATIONAL SITES**

**Environmental Noise**

For the purposes of measuring and quantifying environmental noise at operational sites the noise levels will be defined by  $L_{eq}$ 's measured in dB(A)s over 20 minutes (two 10 minute periods within 3 dB(A)) at each site boundary point during the daytime under normal plant operation. The  $L_{max}$  and  $L_{min}$  at each site boundary point will also be recorded along with any observations which might affect the measured noise levels. Measurements will only be made when the windspeed is less than 5 m/s.

**Areas of Application**

All operational sites will have a site boundary noise survey carried out on a regular basis by the Environmental Protection Office. The frequency will be as follows:

- (i) Large generating sites > 50 MWth: Twice each year
- (ii) Small generating sites < 50 MWth: Once every two years
- (iii) Substations: 10 each year repeating every 3 years. (6 on New Providence, 4 on Family Islands)

The noise surveys will be carried out according to the attached instruction. If following the initial survey, noise levels are found to increase by more than 3 dB(A) then the site manager will be alerted and mitigatory action agreed if it is identified that the plant operation has resulted in this increase. The mitigatory measures will then be implemented to reduce noise levels back down to at least the levels originally recorded.

**Responsibility**

The responsibility for implementing the noise monitoring programme will be the Safety and Environment Manager who may carry out the surveys in parallel to any occupational noise surveys carried out for safety reasons. Site Managers will be responsible for implementing any agreed remedial measures where noise levels have increased.

## Survey Instruction

- Fix at least eight locations around the perimeter fence. Typically these will be of the order of 20-30 metres apart (four only for substations).
- Mark and number these points on a site layout so that they can be identified each year.
- Using a standard noise meter, record the noise level in dB(A) over two ten minute periods at each location. If the two readings are similar (within 3 dB(A)), then the noise level at that location will be the average of the two readings. If not, repeat until agreement reached.
- Record the noise level when the generating units are operating under normal conditions (i.e., is it unlikely that every unit will be on load) using the attached proforma.
- Note any other noise sources that may contribute to the reading at any point, e.g. traffic, other industry.
- Record weather conditions and only take readings during periods of light wind (only measure when wind speed < 5 m/s).
- Record station operational load during the survey.

**BAHAMAS ELECTRICITY CORPORATION**  
**ENVIRONMENTAL MANAGEMENT INSTRUCTION**  
**OP10: WATER EFFLUENT MANAGEMENT**

**Water Effluent Control**

In order that any environmental impact resulting from the discharge of process and surface drainage water can be determined, the quantity and quality of water discharged must be logged dependent on the nature of the cooling system and site contamination.

**Areas of Application**

**Clifton Pier PS**

On line monitoring and logging of the effluent streams measuring flow rate, pH, temperature and conductivity should be implemented and the results should be documented in the water quality log book.

Water quantities used will be recorded and targets set to gradually reduce quantities used on a year by year basis.

For each of the surface drain holes a grab sample (may be solid and liquid) will be taken where practical once a year and analysed for oil, greases, organics and heavy metals (Cd, Hg, Pb, Cu, As, Fe, Cr, Zn) and the data recorded in the water quality log book including time and place of sampling.

The Safety & Environment Department will carry out a general inspection of the cooling water outfall area at least once a year.

**Blue Hills PS**

The drainage holes will be analysed as for Clifton Pier. In addition the process water effluent will be sampled on a monthly basis (logging the time and place of sampling). Each water sample will be analysed for pH and conductivity and the analyses recorded in the site water quality log book.

Water quantities used will be recorded and targets set to gradually reduce quantities used on a year by year basis.

## **Family Islands**

On the occasions when radiator water is discharged, a sample will be taken and analysed for pH and conductivity. Where potassium dichromate is used as an additive, a chromium and iron analysis will be carried out and the values recorded in a station water quality log book.

## **Responsibility**

It will be the Station Manager's responsibility or a delegated engineer, to ensure the above analyses and sampling have been carried out. The Safety and Environment Manager will check on an annual basis that such records are maintained on New Providence, including annual water usage logged against targets and every three years for the Family Islands.

**BAHAMAS ELECTRICITY CORPORATION**  
**ENVIRONMENTAL MANAGEMENT INSTRUCTION**

**OP11: SITE HOUSEKEEPING**

**Site Housekeeping**

This refers to general site tidiness and waste control as well as the general site appearance. It is not clearly defined but is a subjective area. However, good site housekeeping can be used as an indicator of environmental and safety awareness.

**Areas of Application**

All sites run by BEC both operational, decommissioned and administrative should have good housekeeping which can only be monitored by an independent party. The Environmental Protection Office will, therefore, carry out a site housekeeping audit including the use of photographic evidence on a regular basis, e.g. every time a site is visited. The report, including any recommended remedial work, will be sent to the Manager responsible for the site.

**Responsibilities**

The Manager responsible for the site will also be responsible for good site housekeeping and implementing any agreed recommendations made during site visits by the Environmental Protection Office.

**Frequency of Environmental Protection Office Site Visits**

**New Providence:**

At least twice each year, CPPS & BHPS will have a formal site housekeeping audit. Big Pond and Soldier Road will be once each year.

**Family Islands:**

Each site to be audited at least every two years.

# **BAHAMAS ELECTRICITY CORPORATION**

## **ENVIRONMENTAL MANAGEMENT INSTRUCTION**

### **OP12: DISTRIBUTION/TRANSMISSION MAINTENANCE**

#### **Distribution Maintenance**

**This procedure covers any environmental matters related to maintenance of the distribution and transmission network.**

#### **Areas of Application**

The aim of this procedure is to minimise long term environmental impact resulting from activities relating to maintenance of the transmission, transformer substations and distribution network. This will include:

- (a) Noting any new land areas cleared outside designated right of way
- (b) Quantities of weed killer used
- (c) Quantities of wood treatment chemicals used
- (d) Quantities of waste generated by type e.g. metal, wood
- (e) Waste disposal method and location
- (f) Quantities of waste oil
- (g) PCB determination for oil filled transformers.

This information will be recorded on a log sheet, on a regular basis (frequency to be agreed) and checked by the responsible manager before copying to the Environment Protection Office.

The aim of recording these data is to more fully determine the environmental impact and if alternative practices are possible to implement change.

#### **Responsibility**

It will be the responsibility of the distribution manager to ensure that these records are made by an appropriate engineer, verified and copied to the Safety and Environment Manager who will maintain an overview of the maintenance practices compared with current best practice.

## DISTRIBUTION MAINTENANCE LOG SHEET

Location:

Maintenance Carried out:

Date:

Quantity/type waste and  
Disposal Route:

PCB Tests on installed transformers:

Waste oil recovered:

Waste Oil PCB test:

New Land Clearance:

Weed killer used including quantity:

Wood treatment used including quantity:

Signed:

Date:

Verified:

# **BAHAMAS ELECTRICITY CORPORATION**

## **ENVIRONMENTAL MANAGEMENT INSTRUCTION**

### **OP13: STAFF ENVIRONMENTAL AWARENESS - (JOB SPECIFIC)**

#### **Environmental Awareness**

Environmental Awareness is essentially training employees about environmental issues both general and specific and provides a forum for employees to input ideas and ask questions.

#### **Area of Application**

BECs Environmental Protection Office will ensure that all BEC staff receive a minimum of (2) hours job specific environmental awareness training with additional training if requested. This would be in the form of a seminar, videos, or small working groups. In addition the Environmental Protection Office will provide general environmental information to all BEC staff through newsletters, one-off articles and circulars. Topics will include both power related issues and more general environmental issues.

#### **Responsibility**

The responsibility for ensuring that the staff environmental awareness training is carried out will be the Safety and Environment Manager. All BEC Managers will ensure that their staff have adequate time allocated for environmental training on an annual basis.

# **BAHAMAS ELECTRICITY CORPORATION**

## **ENVIRONMENTAL MANAGEMENT INSTRUCTION**

### **OP14: GENERAL WASTE OIL DISPOSAL PROCEDURES**

#### **Waste Oil Disposal**

Any waste oil produced by BEC is likely to be disposed of by incineration or recycling and requires a procedure to log the method used.

#### **Areas of Application**

Waste oil disposal will apply to all waste oil logged under procedure "Waste Oil Production Records" which will have a unique identity. This procedure will record the fate of each drum of waste oil and whether it is incinerated, recycled or disposed of to landfill. These data will be recorded by the Site Manager or Distribution Manager and copied to the Environment Protection Office who will be required to ensure disposal procedures are adhered to.

#### **Responsibility**

It will be the responsibility of the Site Manager to ensure that waste oil disposal sheets are correctly completed by an engineer and that these are copied to the Environment Protection Office.

#### **Frequency**

The log sheets should be completed as and when individual drums of waste oil are disposed of. For Clifton Pier the volume of HFO sludge incinerated will be recorded on a weekly basis. The Safety and Environment Manager will ensure log sheets are completed and are consistent with the waste oil production sheets on a monthly basis.

## WASTE OIL DISPOSAL LOG SHEET

Waste Oil Number:

Oil Type and Quantity:

Location:

Date of Disposal:

Disposal Method:

Transport used  
(including Company):

Verified:

Copy: Safety and Environment Manager

**BAHAMAS ELECTRICITY CORPORATION**  
**ENVIRONMENTAL MANAGEMENT INSTRUCTION**

**OP15: CONTROL OF CHEMICALS**

**Chemicals**

This system relates to the control of chemicals on site. The procurement of chemicals with minimum environmental impact is covered by Instruction "Procurement Guidelines".

**Area of Application**

The main area where chemicals must be controlled is on operational sites, particularly where significant quantities of water treatment chemicals are used. However, it also applies to cleaning fluids used in office buildings which can also have some environmental impact. Each Site Manager will ensure that the following are carried out to minimise the risk of any safety and environmental problem:

- ensure all chemicals are properly labelled and that a hazard data sheet is available and hazard warning sign displayed
- have a designated labelled storage area appropriate to the chemical and quantity kept, i.e. hard standing
- provide all personnel who handle the chemical with proper training and safety equipment if necessary
- record the data and quantity of each chemical delivered to site and where it has been stored and give it a serial number
- record the date when each chemical and container is first used
- provide a contingency plan for clean-up in the event of a spillage
- provide a proper disposal route where required (this may be dilution in the cooling water outfall).

These data should be kept in a chemicals log book with responsibility for maintaining it up to date at all times with the individual using the chemical.

## **Responsibility**

The Site Manager will be responsible for ensuring that staff record the appropriate information in respect of chemicals. The Environment Protection Office will audit the log system on an annual basis in New Providence and every two to three years in the Family Islands.

**BAHAMAS ELECTRICITY CORPORATION**  
**ENVIRONMENTAL MANAGEMENT INSTRUCTION**  
**OP16: ENVIRONMENTAL INCIDENT REPORTING**

**Environmental Incident**

An environmental incident is a non-routine plant operation which results in a release to the environment (air, water and land) of a potentially harmful substance.

**Areas of Application**

This instruction applies to all operational sites on New Providence and the Family Islands. The incident log will be maintained for a minimum of 20 years. Typical examples which will probably require an incidental report are:

- Emissions exceeding design or normal levels
- Fuel spillage
- Oil spillage, eg. lubricant or transformer oil
- Chemicals spillage
- Excessive smoke emissions/particulate fallout
- Noise nuisance
- Pipeline leakage
- Water contamination.

**Responsibility**

It will be the responsibility of the Site Manager to delegate responsibility for recording all environmental incidents, probably to the shift charge engineer. Each incident report will be signed off by both the site manager and subsequently the Safety and Environment Manager within 3 days of the incident occurring. The latter will decide whether there will be any need to review any other procedures as a result of the incident.

## ENVIRONMENTAL INCIDENT REPORT

Location:

Date/time:

Nature of Incident:

Substances Released:

Duration of incident:

Quantity of substances released:

Remedial action taken:

Further action required:

Remedial Action Completion Date:

Similar Occurrences in last 2 years:

Signed off:

Responsible Engineer

Site Manager

Safety and Environment Manager

## **SECTION 3**

### **ENVIRONMENTAL MANAGEMENT INSTRUCTION - NON-OPERATIONAL**

#### **3.1 BACKGROUND**

In this section, we have included the procedures identified with non-operational aspects of BEC's general activities. These procedures include:

- HQ Environmental Performance Review
- Procurement Guidelines
- Staff Environmental Awareness-General
- New Projects - Feasibility Study
- New Projects - Implementation
- Decommissioning Site Management Procedures

#### **3.2 ENVIRONMENTAL MANAGEMENT INSTRUCTIONS**

The environmental management instructions are provided in the following pages for each of the above procedures. These procedures have been numbered for identification purposes with NOP1 representing Procedure Number One under Non-Operational activities.

# **BAHAMAS ELECTRICITY CORPORATION**

## **ENVIRONMENTAL MANAGEMENT INSTRUCTION**

### **NOP1: HQ ENVIRONMENTAL PERFORMANCE REVIEW**

#### **HQ Environmental Performance Review**

By operating a large office complex there is some impact on the environment. This should be reviewed to ensure that any impact has been minimised by the use of proper equipment, disposal procedures and by staff training.

#### **Areas of Application**

HQ environmental performance relates to activities carried out by staff during work and facilities used in HQ. Some of the key areas are:

- Waste production/recycling
- Energy usage
- Cleaning fluids
- Transport.

It is not possible to control all these areas in a rigorous quantitative manner; staff can only be encouraged to carry out their daily business in an environmentally friendly manner. This will be achieved by establishing current working practices by questionnaire and observation and as part of the environmental awareness training encourage improvements. In some cases e.g. low energy electrical fittings, there may be a cost justification for a change.

#### **Responsibility**

It will be the Environment Protection Office's responsibility to review BEC's HQ environmental performance and make suggestions for improvements to all staff which would require approval by the responsible manager. If deemed necessary, they could become mandatory e.g. changing cleaning fluids.

#### **Frequency of Review**

The Environmental Protection Office will carry out a review every three years, adapting the previous review to include the latest information. As a result of the review, targets will be set.

**BAHAMAS ELECTRICITY CORPORATION**  
**ENVIRONMENTAL MANAGEMENT INSTRUCTION**

**NOP2: PROCUREMENT GUIDELINES**

**Procurement**

Each item that is purchased by BEC will have some environmental impact by virtue of either its manufacture, its use or its disposal.

While security of supply and cost considerations are important, it may be possible to minimise environmental damage by purchasing alternative items that are more environmentally acceptable without incurring excessive costs or reduced security of supply.

**Areas of Application**

Introducing environmental criteria into procurement procedures will apply to all areas of BEC's business, both operational and non-operational. Clearly certain aspects have a more significant impact. The system requires both requesting environmental information during the tender stage and in some cases specifying particular criteria. Some recommendations were made in the first Environmental Review for products where specific restriction should apply. Where there is no specific environmental criteria and two tenders meet the specification and are similarly priced, the more environmentally friendly product should be selected.

Initially introducing environmental criteria will be applied to the following range of products where there is found to be no significant cost or supply implication:

- PCB free transformer oils (already in place)
- All chemicals (e.g. mercury free caustic)
- Brake liners (asbestos free)
- Paper (recycled)
- Electrical goods (low energy)
- Aerosols (CFC free)
- Cleaning fluids (chlorine free)
- Transmission poles (from farmed wood sources).

Other products may be added to this list in the light of information received. Hence, information should always be requested for all materials and substances purchased by BEC as a matter of routine.

## **Responsibility**

It will be the responsibility of the Procurement Manager to request the environmental information when purchasing any goods. An Environmental Specification will then be drawn up for the 8 classes of goods named above in conjunction with the Environment Protection Office and included in the overall product specification either as mandatory e.g. PCB free transformer oil, mercury free caustic, or as an option e.g. for electrical goods, recycled paper where a cost analysis will be required. This will be reviewed each year with targets set for more products to be changed to "environmentally friendly" ones.

All staff will be actively encouraged during environmental awareness training to request products which are "environmentally friendly". This will be the responsibility of the Safety and Environment Manager.

**BAHAMAS ELECTRICITY CORPORATION**  
**ENVIRONMENTAL MANAGEMENT SYSTEM**

**NOP3: STAFF ENVIRONMENTAL AWARENESS - GENERAL**

**Environmental Awareness**

Environmental Awareness is essentially training employees about environmental issues, both general and specific, and provides a forum for employees to input ideas and ask questions.

**Area of Application**

BECs Environmental Protection Office will ensure that all BEC staff receive a minimum of (2) hours general environmental awareness training each year. Additional training will be provided if requested. This would be in the form of a seminar, videos, or small working groups. In addition the Environmental Protection Office will provide general environmental information to all BEC staff through newsletters, one-off articles and circulars. Topics will include both power related issues and more general environmental issues.

**Responsibility**

The responsibility for ensuring that the staff environmental awareness training is carried out will be the Safety and Environment Manager. All BEC Managers will ensure that their staff have adequate time allocated for environmental training on an annual basis.

**BAHAMAS ELECTRICITY CORPORATION**  
**ENVIRONMENTAL MANAGEMENT INSTRUCTION**  
**NOP4: NEW PROJECTS - FEASIBILITY STUDIES**

**Feasibility Study**

An in-house or externally run feasibility study for new plant or the change of use of existing plant will require an environmental input to ensure any environmental protection measures are included.

**Areas of Application**

Any new projects for which BEC, or any consultants engaged, carry out a feasibility study shall consider the environmental impact of the project should it go ahead. This will include both the construction and operational aspects of the project. The environmental criteria by which the project is judged will include:

- (i) Any legislation
- (ii) Funding agency requirements
- (iii) Best International Practice
- (iv) Local factors
- (v) Best Practicable Environmental Operations for the Bahamas.

Any environmental costs associated with satisfying these criteria should be included in the overall project costs.

**Responsibility**

The head of the Construction Division will be responsible for ensuring that the environmental aspects of the project are considered. These responsibilities may be delegated to the Project Manager or the consultants engaged for the project who will ensure an environmental specialist, either internal or external, is involved.

**BAHAMAS ELECTRICITY CORPORATION**  
**ENVIRONMENTAL MANAGEMENT INSTRUCTION**  
**NOP5: NEW PROJECT - IMPLEMENTATION**

**New Project Implementation**

Following the feasibility study, if it is decided to go ahead with the project an implementation programme will be drawn up which may include the need for a full Environmental Impact Assessment (EIA).

**Area of Application**

For any new major project an EIA will be carried out by an independent third party which will include some local input in specific areas such as marine ecology. Projects for which BEC will carry out an EIA will include:

- (i) Any new station greater than 50 MWth input
- (ii) Extension of any existing station where the extended capacity exceeds 50 MWth input
- (iii) Any project involving access to National Park areas
- (iv) Any project requiring a permanent structure in the sea.

BEC may also require an EIA where a project may be of a sensitive nature. For other projects an environmental overview will be required as part of the engineering work, including the tender specification and may, in some instances, be the responsibility of the Safety and Environment Manager.

The appointed engineer will also have the capability to ensure that the environmental requirements for the project are met, including the contractors obligations, during both the construction and commissioning phase. This will ensure that any environmental performance criteria are met and ensure that there is no harm caused to the local environment.

**Responsibility**

The head of Construction Division, in consultation with the Safety and Environment Manager, will be responsible for ensuring that the environmental impact of the project is managed properly. These duties will likely be delegated to the site engineer who will engage an environmental specialist from time to time as deemed necessary.

# **BAHAMAS ELECTRICITY CORPORATION**

## **ENVIRONMENTAL MANAGEMENT INSTRUCTION**

### **NOP6: DECOMMISSIONED SITE MANAGEMENT PROCEDURES**

#### **Site Management**

All decommissioned sites, including parts of operational sites, are a potential environmental problem either through past contamination, through deterioration of old infrastructure or just abuse of the site. Proper site management is aimed at preventing environmental harm occurring in decommissioned site.

#### **Areas of Application**

Any site which has old generating units which are no longer operating classifies as a decommissioned site. This requires regular inspection to ensure there has been no deterioration in the site and that the perimeter fencing remains intact. In essence, this is a "site housekeeping" review.

#### **Responsibility**

It will be the responsibility of the designated Site Manager to ensure that the decommissioned site or area does not cause any environmental harm. The Safety and Environment Manager will carry out a site audit on a regular basis which is expected to be twice yearly for sites on New Providence and once every 2-3 years on the Family Islands. Any remedial work recommended from the audit will be agreed with the Site Manager who will be responsible for its implementation

## **SECTION 4**

### **ENVIRONMENTAL MANAGEMENT INSTRUCTION - EXTERNAL**

#### **4.1 BACKGROUND**

In this section, procedures have been developed to deal with external environmental issues which may result from BEC's current and future activities. These procedures are as follows:

- Public Complaints Record
- Public Environmental Protection
- Promoting Energy Efficiency

#### **4.2 ENVIRONMENTAL MANAGEMENT INSTRUCTIONS**

These instructions are provided in the following pages for each of the above procedures. These procedures have been numbered for identification purposes with EXT1 representing Procedure Number One under External aspects of BEC's activities.

**BAHAMAS ELECTRICITY CORPORATION**  
**ENVIRONMENTAL MANAGEMENT INSTRUCTION -**  
**EXTERNAL**

**EXT1: PUBLIC COMPLAINTS RECORD**

**Public Complaint**

A public complaint is any communication received by BEC questioning the acceptability of a specific operation. This may refer to a specific incident or be more general in nature.

**Areas of Application**

A public complaint may be received in connection with any aspect of BEC's business. An environmental complaint will be any communication which relates to a release to the environment which may potentially cause public concern. These may be sent to the General Manager or other departments within the corporation. These should all be logged by the department and copied to the Safety and Environment Manager who will collate and log all environmental complaints, follow them up with the individual complainant and ensure appropriate remedial action is agreed and taken by the responsible Site Manager and the action taken logged with the complainant.

**Responsibility**

It will be the responsibility of all managers to copy every environmental complaint to the Safety and Environment Manager who will be responsible for collating these reports and driving any remedial action forward. The Public Relations Department will be consulted if deemed necessary.

**BAHAMAS ELECTRICITY CORPORATION**  
**ENVIRONMENTAL MANAGEMENT INSTRUCTION**  
**EXT2: PUBLIC ENVIRONMENTAL PROMOTION**

**Public Environmental Promotion**

This is essentially a Public Relation exercise to ensure that no public misconceptions about BEC's environmental credentials develop and publicise the positive aspects of how BEC are improving their environmental performance.

**Areas of Application**

Any area of BEC's business can be affected by public pressure which necessitates a proactive approach to public education to prevent any campaign becoming a threat to BEC's integrity. This will include:

- (1) Annual environmental performance reports
- (2) Promoting energy efficiency, see EXT3
- (3) Making all sites publically accessible and encouraging site visits
- (4) Responding to all environmental complaints, see EXT1.

**Responsibilities**

All site managers are responsible for ensuring that public Relations are maintained at a satisfactory level. The Environment Protection Office and Public Relations Department will ensure technical information and expertise is available to answer any queries raised by the public.

**Frequency of Review**

The Safety and Environment Manager and Public Relations Manager will constantly review the Public Environmental Promotion campaign and a new set of annual targets will be agreed with the General Manager each year to continually improve BEC's environmental image.

**BAHAMAS ELECTRICITY CORPORATION**  
**ENVIRONMENTAL MANAGEMENT INSTRUCTION**  
**EXT3: PROMOTING ENERGY EFFICIENCY**

**Energy Efficiency**

The use of energy in a more efficient way thereby giving rise to less pollution for the same task is a primary method by which a utility can improve its environmental performance.

**Areas of Application**

Energy efficiency should be promoted both internally e.g. through training, procurement of low energy goods and externally by educating consumers. Such promotion are most effective where specific areas are targeted which will initially require market research to establish how BEC's electricity is used. Once this is completed the Environment Protection Office will form a BEC Energy Management Team which includes both Public Relation and System Development representatives to develop and implement an energy efficiency drive. The Public Relations Department should continue with the current programme of Public information.

**Responsibilities**

The Environment Protection Office will be responsible for managing the energy efficiency programme in collaboration with other departments, particularly the Public Relations Department.

**Frequency of Review**

The Environment Protection Office will review and report progress on an annual basis, including a statement in the annual review. New targets will be set on an annual basis.

## **SECTION 5**

### **ENVIRONMENTAL MANAGEMENT INSTRUCTION - ANNUAL REVIEW**

#### **5.1 BACKGROUND**

In this section, procedures have been developed which will provide a feedback on BEC's environmental performance. These procedures include:

- Performance Review
- Environmental Performance Targets.

#### **5.2 ENVIRONMENTAL MANAGEMENT INSTRUCTIONS**

These are provided in the following pages for each of the above procedures. For identification purposes, each procedure has been numbered with AR1 representing Procedure Number One under the Annual Review exercise.

**BAHAMAS ELECTRICITY CORPORATION**  
**ENVIRONMENTAL MANAGEMENT INSTRUCTION**

**AR1: PERFORMANCE REVIEW**

**Performance Review**

The environmental performance review quantifies BEC's environmental performance over the previous year and checks compliance with the Corporate Environmental Policy. It also compares the year with previous years and identifies whether agreed targets have been met. Improvement targets for the following year are also set out as required by instruction AR1.

**Areas of Application**

The environmental performance review will cover all areas of BEC's business as outlined earlier. It will include data collected on a regular basis and also require collation of activities on an annual basis. The information will be written in a comprehensive review document with a non-technical summary for public information.

**Responsibilities**

It will be the responsibility of the Environment Protection Office with the help of all staff, to collate the information and produce the review documents. BEC's Executive will be required to review the corporate performance both in respect of meeting agreed targets, setting new targets and whether data gathering has been carried out by the responsible manager.

**Frequency**

The review will be produced on an annual basis.

**BAHAMAS ELECTRICITY CORPORATION**  
**ENVIRONMENTAL MANAGEMENT INSTRUCTION**  
**AR2: ENVIRONMENTAL PERFORMANCE TARGETS**

**Environmental Performance Targets**

Each year a series of targets will be set and agreed by the Executive. Responsible Managers will ensure that these are implemented.

**Areas of Application**

Environmental Performance Targets apply to all BEC's business. The target requirement may be, for example, an operational change, installation of monitoring equipment or new plant or a change in procurement practice. These will be agreed on an annual basis and included in each managers business plan. If a budget is required for new equipment this will also be included in the business plan. BEC's environmental team will have the task of prioritizing any expenditure on environmental improvements.

**Responsibilities**

All managers will be responsible for ensuring that environmental performance targets are met. BEC's environmental team will prioritise any necessary spending required to meet the annual improvement plan. It will be BEC's Executive Committee's responsibility for agreeing these targets as an integral part of the business plan.

**Frequency of Review**

Targets will be constantly monitored by each responsible manager and reviewed annually by BEC's environmental team.

## **SECTION 6**

### **TERMS OF REFERENCE FOR AN EXTERNAL AUDIT**

#### **6.1 SCOPE OF WORK**

The purpose of the external audit will be to independently review and verify data used and statements made in BEC's Corporate and Site Specific Environmental Reviews covering the 12 month period 1st January to 31st December. In particular, to verify that the published data and statements give a true and fair view of the company's environmental performance.

#### **6.2 DEPTH OF INVOLVEMENT**

To carry out an examination of selected BEC operational and non-operational sites to establish the adequacy of:-

- the operational mechanisms for the implementation and review of BEC's environmental policy and practices, including performance against agreed targets,
- the systems used to gather environmental data,
- the system of internal verification, the output and follow-up actions resulting.

In addition the successful tenderer may be required to become involved in the review preparation at an early stage, particularly by providing advice on form and content during the review formulation stage.

#### **6.3 DELIVERABLES**

- Comments for inclusion verbatim in the Corporate Environmental Performance Review,
- A brief overall report outlining the findings of the review verification exercise in more detail. This will be used internally by BEC's Environment Protection Office as a tool to aid further improvement,
- The verifier should be prepared to make an informal presentation on the results of the review exercise to BEC's directors and selected managers (this would be subject to a separate variation to contract and as such should be included as a separate fixed price sum in your submission).

#### **6.4 REVIEWERS PRE-REQUISITES**

- The team should have previous experience in the preparation of company environmental reviews. Please indicate at least two references from recent

clients in this area of work and include copies of the attendant reports with your submission. Please include resumes of the individuals who would undertake the verification.

- The team should have previous experience of work in/with the Power or Petrochemical Industry. Please provide brief resumes of recent experience.

## **6.5 METHOD OF APPROACH**

The verification methodology to be used must be included as part of the tender submission. The methodology of the successful tenderer may be used externally in order to show the transparency of the exercise.

## **6.6 TIME REQUIRED AND PROGRAMME**

The following time-scales are fixed in order to meet the time-table for publication of the Corporate and site Environmental Reviews.

Invite to tender - 1st Oct  
Submit tender - 1st Nov  
Contract let - 14th Nov  
Verification start date - 22nd Nov  
Draft verification statements- end March  
Final verification statements - Mid April  
Reviews finalised - end April

We would anticipate a maximum of 15 mandays being appropriate for this working including one week visiting BEC. Although the body of the work will be completed between January and March, some contact is expected in November/December the previous year in order to set up the detailed verification exercise and to provide initial advice to BEC on the process.

## **6.7 BEC CONTACT**

The BEC contact is Everette Rolle who will act as BEC HQ facilitator/coordinator and can be contacted at BEC HQ in Nassau.

**6.8 COSTS/FEES**

Please indicate a fixed fee for this work exclusive of travel & subsistence. Rates for travel & subsistence should also be included.

**6.9 REPORT SUBMISSION**

The deadline for submission of tenders is Noon on 1st November 199?.

## **BAHAMAS ELECTRICITY CORPORATION ENVIRONMENTAL POLICY**

### **STATEMENT OF INTENT**

The BEC Board is committed to this Environmental Policy which requires that we consider the environmental impact of all of our activities, both operational and non-operational.

Regular audits of the Corporation's environmental performance will be carried out to ensure that the Policy objectives are achieved and regularly reviewed.

BEC will make an annual statement of its environmental performance to demonstrate to the public, staff, and funding agencies that BEC is achieving improvements.

### **ENVIRONMENTAL POLICY PRINCIPLES**

The Bahamas Electricity Corporation will:

- Integrate environmental factors into business decisions and corporate management
- Monitor compliance with a voluntary set of environmental regulations
- Strive to continuously improve on environmental performance
- Review the company's environmental performance on a regular basis and publish the results
- Safeguard the health and safety of BEC employees and increase their environmental awareness.

### **IMPLEMENTATION**

#### **Internal**

The Corporation's environmental performance, as set out in the Policy, will be the responsibility of the General Manager and the BEC Board.

The Board will set clear annual environmental performance targets for which individual managers will be responsible for implementing the Policy throughout the Corporation and promoting environmental awareness amongst all employees.

Plant development technologies will be adopted which improve the Corporation's overall environmental performance. Careful site selection will ensure ecological disturbance is minimised.

When selecting contractors and suppliers of goods or services, BEC will give preference to the use of companies with sound environmental management.

**External**

BEC will strive to promote the adoption of energy efficient appliances and practices by its customers.

In carrying out its operations, BEC will ensure that the impact on the environment is minimised.

**REPORTING**

BEC will make available information to the public on its environmental performance and will allow public access to its sites.

## **STATION CHEMIST**

### **BASIC RESPONSIBILITIES**

As Station Chemist he is responsible for all chemical services in the Power Station.

He reports to and is accountable to the Power Station Manager and for the correct procedures required for the production of high quality waters and maintenance of chemical standards and the organisation and control of the laboratory services and analyses.

As a staff grade he performs mainly on his own and provides the chemical guidelines that operations staff have to follow.

### **1. DUTIES AND RESPONSIBILITIES**

Performs the following:

- i) Directs the laboratory personnel to ensure that all chemical analyses are executed and plant chemical services are provided.
- ii) Ensures that BEC Safety Rules are observed and is responsible for developing special procedures for dealing with dangerous and toxic substances, including the handling of bulk chemicals.
- iii) Responsible for acquisition of adequate laboratory chemicals and analytical equipment and the care and maintenance of laboratory equipment.
- iv) Sets the chemical standards of the station.
- v) Sets the chemical procedures and standards to be followed.
- vi) Organises sampling on a routine basis of water, fuels, oils, luboils and process chemicals.
- vii) Undertakes specialised analyses when necessary, supervises laboratory staff, records and reports results and prepares operating instructions for maintenance or correction of standards.
- viii) Ensures that the water treatment processes are performed correctly and that the operators are trained sufficiently for this purpose.
- ix) Ensures correct treatment of effluents to the environmental and routine chemical checks on effluents.
- x) Checks the atmospheric pollution emitting from the Power Station to ensure that limits are not being exceeded.

- xi) Advises on chemical treatment of raw, clarified, demineralised, cooling, boiler feed and boiler waters.
- xii) Advises on blowdown rates of boiler and C.W. water required to maintain water qualities within defined parameters.
- xiii) Responsible for post service chemical cleaning procedures including safety precautions and provision of chemicals monitoring and inspection services.
- xiv) Undertakes corrosion monitoring and surveys, investigation of scales and deposits.
- xv) Conducts quality control checks on bulk process chemicals as delivered.
- xvi) Provides monitoring services to ensure safe working atmospheres within enclosed spaces.
- xvii) Liaises with the appropriate authorities to ensure that the effects of Power Station Operations on the local environment are minimised.
- xviii) Responsible for and actively participates in training laboratory staff in all aspects of their duties.
- xix) Assists in the preparation of relevant budget estimates.

**2. APPROVES THE FOLLOWING**

- i) Chemical analyses techniques
- ii) Methods and frequency of sampling
- iii) Chemical reports and operational guidelines
- iv) Purchase requisitions
- v) Stores requisitions
- vi) Certificates allowing entry into confined spaces.

**3. CO-OPERATES AND LIAISES WITH:**

All persons in connection with and necessary for the efficient performance of his duties.

## **STATION CHEMIST**

### **BASIC RESPONSIBILITIES**

As Station Chemist he is responsible for all chemical services in the Power Station.

He reports to and is accountable to the Power Station Manager and for the correct procedures required for the production of high quality waters and maintenance of chemical standards and the organisation and control of the laboratory services and analyses.

As a staff grade he performs mainly on his own and provides the chemical guidelines that operations staff have to follow.

### **1. DUTIES AND RESPONSIBILITIES**

Performs the following:

- i) Directs the laboratory personnel to ensure that all chemical analyses are executed and plant chemical services are provided.
- ii) Ensures that BEC Safety Rules are observed and is responsible for developing special procedures for dealing with dangerous and toxic substances, including the handling of bulk chemicals.
- iii) Responsible for acquisition of adequate laboratory chemicals and analytical equipment and the care and maintenance of laboratory equipment.
- iv) Sets the chemical standards of the station.
- v) Sets the chemical procedures and standards to be followed.
- vi) Organises sampling on a routine basis of water, fuels, oils, luboils and process chemicals.
- vii) Undertakes specialised analyses when necessary, supervises laboratory staff, records and reports results and prepares operating instructions for maintenance or correction of standards.
- viii) Ensures that the water treatment processes are performed correctly and that the operators are trained sufficiently for this purpose.
- ix) Ensures correct treatment of effluents to the environmental and routine chemical checks on effluents.
- x) Checks the atmospheric pollution emitting from the Power Station to ensure that limits are not being exceeded.

- xi) Advises on chemical treatment of raw, clarified, demineralised, cooling, boiler feed and boiler waters.
- xii) Advises on blowdown rates of boiler and C.W. water required to maintain water qualities within defined parameters.
- xiii) Responsible for post service chemical cleaning procedures including safety precautions and provision of chemicals monitoring and inspection services.
- xiv) Undertakes corrosion monitoring and surveys, investigation of scales and deposits.
- xv) Conducts quality control checks on bulk process chemicals as delivered.
- xvi) Provides monitoring services to ensure safe working atmospheres within enclosed spaces.
- xvii) Liaises with the appropriate authorities to ensure that the effects of Power Station Operations on the local environment are minimised.
- xviii) Responsible for and actively participates in training laboratory staff in all aspects of their duties.
- xix) Assists in the preparation of relevant budget estimates.

## **2. APPROVES THE FOLLOWING**

- i) Chemical analyses techniques
- ii) Methods and frequency of sampling
- iii) Chemical reports and operational guidelines
- iv) Purchase requisitions
- v) Stores requisitions
- vi) Certificates allowing entry into confined spaces.

## **3. CO-OPERATES AND LIAISES WITH:**

All persons in connection with and necessary for the efficient performance of his duties.

## APPENDIX B

### PROPOSED STANDARD UNITS FOR MEASUREMENT

The following units are proposed as those being standard for all BEC's operation. The aim will be to provide performance data with a common unit to minimise the time correcting for different units.

#### (1) Stack Emissions

Concentration	mg/m <sup>3</sup> (at 0°C, 1 atmosphere, 11% O <sub>2</sub> , dry)
Annual Release	tons/annum
Temperature	°C
Velocity	m/s
Volume flux	m <sup>3</sup> /s @ exit conditions
Stack diameter and height	metres

#### (2) Water Quality

Flow rate	m <sup>3</sup> /s
Concentration	mg/m <sup>3</sup>
Temperature	°C
Conductivity	µS/cm

#### (3) Solid Waste

tons

#### (4) Fuel Oil

Delivered	tons
Consumption Rate	tons/annum
Storage Capacity	US Gallons

**(5) Lubricating Oil**

Delivered	Litres
Consumption Rate	Litres/annum
Waste oil production	tons/annum

**(5) Noise**

Equivalent noise level	Leq in dB(A)
Max noise level	L <sub>max</sub> in dB(A)
Min noise level	L <sub>min</sub> in dB(A)



## APPENDIX C

### SOME GENERAL INFORMATION ON "DUTY OF CARE" (Part of Environmental Protection Act 1990, UK)

#### (A) A PRACTICAL COMPLIANCE WITH THE DUTY OF CARE

In view of the nature of the Code industry will need to be, perhaps, over cautious in the measures it takes to discharge the duty of care - at least, while the case law around the duty is being developed.

Much practical guidance is given in the Code and that has been detailed above. However, there are some additional practical steps that a producer should take, for example:

- (1) He should identify and monitor all the waste streams from the premises in quantity and composition, if necessary, obtaining an analysis by a reputable waste disposal contractor.
- (2) He should consider the best practicable environmental option for the disposal of each waste stream.
- (3) He should conduct an audit of the proposed waste disposal site and/or the carrier (it must be remembered that the fact that a carrier is licensed is no indication of his suitability to accept any particular type of waste or any guarantee of competence). The Waste Disposal Authority should be able to supply the names of respectable companies. The national grouping of waste disposal contractors known as NAWDC (The National Association of Waste Disposal Contractors) and the Road Haulage Association may be other useful sources of information. The members of NAWDC are required to undertake a series of obligations as a condition of membership. Many of these obligations could be incorporated directly as terms of contract.

The Chemical Industries Association has produced for its members a useful set of guidelines on auditing waste disposal contractors. The steps recommended by the CIA include a consideration of:

- the reputation of the company and calibre of the staff;
- the relationship between the company and the waste regulation authority;
- whether the site is well run, adequately fenced and manned, and has sufficient laboratory facilities;
- the conditions attached to the site licence;
- whether the waste would be compatible with others being received by the site;

- whether the price is of the right order to ensure that the operation is well-run;
  - whether the company has insurance cover.
- (4) He should enter into written contracts for waste disposal and/or carriage. Very few waste producers, even major ones, probably have adequate contracts for the management, transportation and disposal of their waste. Although the draft Code makes no reference to such contracts, it is difficult to see how a waste producer can adequately discharge his duty of care without a written contract.

Even when there is a written contract, many large waste disposal contractors will have their own standard terms of contract and the scope for negotiation may in practice be limited. However, producers with operations at a number of sites may have an opportunity to obtain more competitive terms by negotiating global waste disposal contracts for a number of sites with one or more contractors. In any event, waste producers should think of imposing their own standard contract wherever appropriate, and if this cannot be used, should review the terms of contractors' conditions very carefully, referring them, if necessary to the Company's head of environmental matters, or to in-house or outside lawyers.

Ideally, the contract should include undertakings by the waste disposal contractor:

- to obey all relevant laws (the duty of care should be incorporated as a term of contract) and to dispose of the waste in the agreed manner at the agreed site; and
- to provide the producer with access to the site for spot checks

It should also provide for:-

- liability for accident at the disposal site (and in transit, if the disposal contractor is also the waste carrier);
- the point of transfer of ownership of waste;
- assignability and sub-contracting (if the waste disposal contractor does not provide his own vehicle, it should clearly stated which of the parties employs the haulier);
- adequate insurance against damage to third parties;
- indemnities against liability resulting from the contractor's negligence and from pollution caused by the contractor mixing the producer's waste with other waste;

- termination of contract in the event of a serious breach

In addition, the customer is likely as a minimum to have to undertake:

- to provide a description of the waste that is sufficient to enable its safe handling and disposal and that the waste corresponds with that description;
- to notify changes in the waste description;
- to ensure that any packaging is fit for its purposes;
- to comply with any other legal requirements regarding the waste - e.g. the Special Waste Regulations or the Classification, Packaging and Labelling of Dangerous Substances Regulations.

- (5) A producer should monitor the performance of contractors. The Code of Practice stresses that anyone subject to the Duty of Care has an obligation to prevent others committing offences in relation to controlled waste. Therefore it should be stressed that if, in dealings with any waste disposal contractor, a site manager becomes aware of, or suspects that, certain practices are being undertaken that are likely to constitute a breach of legislation he should take action immediately by drawing it to the contractor's attention and asking him to take all appropriate action to cease and/or remedy the breach. Site managers should be required to report any continued or repeated breach or any serious breach to the company's head of environmental affairs. The contractor should then be given a final opportunity to explain himself and to cease and/or remedy the breach. He should be warned that such breach may be reported to the relevant waste regulation authority and may result in termination of the waste disposal contract. It will be important to ensure that all discussions with the contractor in this connection are fully and clearly documented.

Any decision to report a breach to the relevant waste regulation authority should be taken at senior management level after having taken all steps to rectify the nature and circumstances of the breach and confirm that such breach has actually taken place. Reporting any alleged breach which is unfounded clearly could have a damaging effect on the reputation and business of the contractor who could in turn be justified in seeking compensation for any false accusation.

- (6) Written procedures and guidelines on disposal should be developed. Depending on the nature of the company's activities, a detailed code of practice may be appropriate. This would deal, inter alia with waste storage, packaging, labelling, maintaining records and the selection of waste disposal contractors. Its production may involve considerable time and energy but its value in preventing future mistakes, especially, for example, in industries with hazardous waste, will be quickly appreciated.

- (7) A producer should ensure that all employees have a proper understanding of the duty of care and the company's disposal procedures. Employers will need to provide adequate equipment training and supervision to ensure that the duty is understood and discharged at all levels of the company. A director or senior manager should be made accountable to the board to ensure that the waste is properly managed and disposed of.
- (8) Up-to-date information should be maintained of legal changes which could affect waste management operations and procedures amended accordingly.
- (9) A producer should follow developments in technologies for the reduction, recycling or treatment of waste.
- (10) Proper records of all types and quantities of wastes generated and the means of disposal should be kept. Although it is acknowledged that this may present practical difficulties, samples of each batch of waste should be retained. This would enable the waste producer to ascertain, in case of any accident or liability particularly where it appears that the contractor has mixed waste without authorisation, whether its waste is responsible for any loss or damage. There is no set form for those records and it is possible that the existing records kept by many waste producers will be adequate. The draft Code contains a suggested standard form. All producers (and holders) of waste should also be ready to review their documentation relating to the description and transfer of waste to ensure compliance with the record keeping requirements of the Duty of Care regulations once they are in force. Those who have no documentation should set about considering what should be appropriate for their business in the light of the requirements of the regulations.
- (11) Waste management performance should be reviewed regularly to see that standards and practices are maintained and improved.

**(B) WASTE CARRIERS**

All companies dealing with waste carriers should check that the carriers are properly registered or are exempt from registration. The carrier should be required to produce his certificate of registration or an official copy of it (provided by the waste regulation authority: a photocopy is not valid). [In addition, before using any carrier for the first time, the Code on the Duty of Care advises the waste producer to check with the waste regulation authority with which the carrier is registered that his registration is still valid, even if his certificate appears to be current. The authority's name and other details are shown on the certificate. In instances where a certificate has not been produced, it will be difficult to know where to search for registration. The proposal for a co-ordinated Local Authority Database for Waste Carriers ("CLAWDAC") may solve the problem. The objective of CLAWDAC is to establish a database which will contain particulars of all registered carriers in Great Britain, wherever they are actually registered. CLAWDAC will therefore enable waste regulation authorities to advise producers of controlled waste whether carriers not registered in their area are registered with another waste regulation authority. Discussion on CLAWDAC are still proceeding.]

