Environmental Action Plan (EAP) for JPSCo

As part of the appraisal of the proposed corporate loan to JPSCo by IFC of which Loan Agreement is expected to be signed in early 2003, JPSCo proposed various environmental actions (i) to improve environmental and social performance of the existing operations of JPSCo in accordance with Jamaican environmental requirements/guidelines and (ii) to ensure that the 120MW Bogue expansion unit is developed in compliance with both Jamaican environmental requirements/guidelines and the World Bank Group environmental and social policies and guidelines. This Environmental Action Plan (EAP) summarizes JPSCo's intended next steps in a number of areas. IFC understands that JPSCo will commit to the activities detailed in the EAP. IFC will monitor the on-going implementation of the EAP by JPSCo.

The EAP is based on the information available at the time of appraisal in 2002, and will be updated as appropriate and as necessary, satisfactory to both JPSCo and IFC.

The EAP consists of:

Bogue Expansion-Specific

1. Environmental Management
2. Environmental Mitigation
3. Environmental Monitoring

JPSCo Corporate-Wide

4. Environmental Management
5. Environmental Mitigation
6. Environmental Monitoring
7. Other Actions Related to IFC Corporate Loan

Prepared by Jamaica Public Service Company

No.	Action Description	Implementation Schedule	Responsibility	Capital Cost (US$)	Annual Recurrent Cost (US$)
1.	**Environmental Management (Bogue Expansion)**				
1.1	**Management Responsibility.** 1. Ensure that the Environmental Action Plan relevant to Bogue Power Station (including its 120MW expansion) be implemented under the shared responsibility of JPSCo's Environmental Affairs Department (EAD), the Engineer/Project Manager at the project site, and the Plant Manager at the Bogue Power Station.	Construction / Operation	Environmental Affairs Dept (EAD), Engineer / Project Manager (EPM) , Bogue Power Station Plant Manager (BPSPM)	N.A.	N.A.
1.2	**Training.** 2. Develop and implement training programs as a component of an Environmental Management System to ensure that all responsible personnel are equipped with the necessary expertise to conduct their individual tasks. Programs will include: • Fuel management. • Operation and maintenance of pollution control equipment. • Sampling and analysis of effluent and emissions. • Operational aspects of the turbines to ensure that all equipment are operated according to manufacturer's specifications.	Before start of Phase II[1] operation & thereafter	EAD, EPM, BPSPM	N.A.	To be budgeted annually

[1] Phase I is the commercial operation of the two simple-cycle gas turbine units of Bogue expansion (40MW x 2), and Phase II is the commercial operation of the combined-cycle power plant of Bogue expansion (120MW).

No.	Action Description	Implementation Schedule	Responsibility	Capital Cost (US$)	Annual Recurrent Cost (US$)
1.3	**Occupational Health & Safety.** 3. Give clear guidelines to all contractors, employees and visitors authorized to visit the site as to the safety requirements for the site.	Construction & Operation	EPM, BPSPM	H&S equipment cost included in the project cost.	To be budgeted annually.
1.4	**Emergency Response.** 4. Incorporate emergency response procedures for the 120MW combined-cycle plant into an Emergency Response Plan for the Bogue Power Station and submit the **revised Emergency Response Plan** to Manager, Pollution Prevention and Control Branch of NEPA within three months of the date of commissioning of the plant.	Within 3 months of commissioning Phase II	EAD, EPM, BPSPM	N.A.	N.A.
2.	**Environmental Mitigation (Bogue Expansion)**				
2.1	**Air Emission.** 1. Use water injection to keep NO_x emission levels at 80ppm (0 degree Celsius, 1 atmospheric pressure, 15% excess Oxygen level) or lower and 0.5% sulfur distillate oil for fuel burning.	Operation	EPM, BPSPM	Included in the project cost.	Included in the annual O&M budget
2.2	2. Install a stack of height of 25m or higher.	Design	EPM	Ditto.	N.A.
2.3	3. Water-dampen road areas and construction areas at a minimum twice a day and if necessary increase the frequency.	Construction	EPM	N.A.	Included in the project cost.
2.4	4. Ensure transportation vehicles carrying marl or earth be covered.	Construction	EPM	N.A.	Ditto.
2.5	5. Dampen earth and/or marl stockpiles to prevent dust nuisance.	Construction	EPM	N.A.	Ditto.

No.	Action Description	Implementation Schedule	Responsibility	Capital Cost (US$)	Annual Recurrent Cost (US$)
2.6	**Water.** 6. Collect surface runoff using a storm water detention pond and routing it offsite via ditches and drainage pipes.	Construction & Operation	EPM, BPSPM	Included in the project cost	N.A.
2.7	7. Ensure that all spills and leaks will be discharged via floor drains into sewers and sumps and eventually an oil/water separator.	Operation	EPM, BPSPM	Ditto.	N.A.
2.8	8. Attach equipment skids to areas where minor leaks are possible, and clean minor leaks periodically as necessary.	Operation	EPM, BPSPM	Ditto.	N.A.
2.9	9. Discharge sewage effluent into the nearby municipal wastewater plant (NWC Sewage Treatment Ponds at Bogue).	Operation	BPSPM	N.A.	Included in annual O&M budget.
2.10	10. Discharge trade effluent from the plant by returning it to the NWC wastewater treatment Ponds. Monitor discharge according to the NWC-JPS agreement.	Prior to Operation	BPSPM, EAD	N.A.	N.A.
	Noise.				
2.11	11. Ensure that the expansion facility be equipped with silencers on the intake filters and boilers and turbine enclosureand other necessary insulation to meet the required noise levels outside the plant boundary in accordance with Jamaican requirements and World Bank Group noise guidelines.	Design	EPM, BPSPM	Included in the project cost.	N.A.
2.12	12. Plant trees around the new perimeter of the property.	Construction	EPM, BPSPM	Included in the project cost.	N.A.

No.	Action Description	Implementation Schedule	Responsibility	Capital Cost (US$)	Annual Recurrent Cost (US$)
	Petroleum Management.				
2.13	13. Install fuel shut-off valves, sumps and sump pumps, spill containment structures (including secondary measures) and oil/water separators.	Design & Construction	EPM	Included in the project cost.	N.A.
2.14	14. Check all valves, pipelines and flanges weekly to reduce the potential for spills.	Operation	BPSPM	N.A.	Included in annual O&M.
2.15	15. Document "Spill Prevention Control Plan" for the new facility and incorporate it into the general "Emergency Response Plan" for the Bogue Power Station.	Prior to Operation	EPM, BPSPM	N.A.	N.A.
2.16	16. Store Waste oil and oily sludge in appropriately labeled tanks or drums.	Operation	BPSPM	N.A.	Included in annual O&M.
2.17	17. Install appropriate fire fighting equipment at the new facility (see details in No. 2.26)				
2.18	18. Conduct structural integrity tests of petroleum storage tanks and pipelines in accordance with industry standards.	Design / Construction Operation	EPM, BPSPM EPM, BPSPM	Included in the project cost. N.A.	Included in annual O&M. Ditto.
2.19	19. Install spill containment unit (Bundwall) – 1.2 x capacity of oil storage tank.				
2.20	20. Develop "Waste Oil Management Plan" for the 120MW expansion unit to include disposal in an approved manner.	Design / Construction Prior to Operation	EPM EPM, BPSPM	Included in the project cost. N.A.	N.A. N.A.
2.21	21. Ensure that facilities are in place to prevent oil spill or leakage during transfer of fuels.	Design / Construction	EPM	Included in the project cost.	N.A.
2.22	**Solid Waste.** 22. Ensure that solid waste generated during	Construction	EPM	Included in the project cost.	

No.	Action Description	Implementation Schedule	Responsibility	Capital Cost (US$)	Annual Recurrent Cost (US$)
	construction will be removed by the contractor for waste management in Montego Bay and disposed of at the Retirement Dump.				
	Fire Protection.				
2.23	23. Discuss with Fire Department as to safety requirements.	Operation	EPM, BPSPM	N.A.	N.A.
2.24	24. Install fire-fighting equipment for inspection and approval by Fire Department before fuel is received in storage tanks.	Prior to Operation	EPM	N.A.	N.A.
2.25	25. Conduct integrity tests of storage tanks and pipeline half yearly for the first year of operation and annually thereafter.	Operation	BPSPM	N.A.	Included in annual O&M.
2.26	26. Install fire-protection system proposed in the EIA of September 2001 consisting of: a. Fire-protection system for the turbines and gas compartment areas of the accessory module, lube and hydraulic area, meeting the Local and National Fire Protection Association code requirements. b. Detection, alarm, actuation and signaling systems. c. Firewater pumps consisting of 2 x 100% capacity (one AC motor driven and one standby diesel driven pumps). d. All fire trouble and water flow alarms will sound in the control room. e. An automatic gas fire protection system for the electrical equipment and control rooms.	Design / Operation	EPM, BPSPM	Included in the project cost.	N.A.

No.	Action Description	Implementation Schedule	Responsibility	Capital Cost (US$)	Annual Recurrent Cost (US$)
	f. An automatic fire detection (heat and smoke) provided in the electrical equipment and rack room, control room and chemical feed enclosure, in addition to hand held fire extinguishers. g. Low-pressure carbon dioxide fire protection system for the combustion turbines. h. Transformer deluge system designed to operate automatically, actuated by a heat sensitive pneumatic pilot system. i. Firewalls around transformers designed in accordance with the requirements of NFPA 850 3.1.4. j. Fuel oil storage tanks protected with a single ring deluge spray system on the outside and with form/water spray on the outside, There is provision for foam/water for the inside. k. Steam turbine lube oil system protected with deluge spray system. l. Cooling tower protected with deluge spray system. m. Wet pipe sprinkler systems at the administration building, the office space in the control building, the maintenance shop and the chemical feed enclosure. n. Fire hydrants installed and protected if subject to mechanical damage. o. Firewater storage tank with capacity of				

No.	Action Description	Implementation Schedule	Responsibility	Capital Cost (US$)	Annual Recurrent Cost (US$)
	900,000 litres.				
2.27	**Adjacent Land Use and Related Mitigation Measures.** 27. Build a 6-foot high perimeter fence around the site to screen the adjacent graveyard, industrial and residential areas.	Prior to Operation	EPM, BPSPM	Included in the project cost.	N.A.
3	**Environmental Monitoring (Bogue Expansion)**				
3.1	**General.** 1. Ensure that sampling and monitoring points are safe and accessible.	Design / Operation	EPM, BPSPM	Included in the project cost.	N.A.
3.2	2. Keep all records of operation including environmental monitoring for at least 10 years and ensure that they are readily available for inspection by NEPA's representatives.	Operation	BPSPM, EAD	N.A.	N.A.
3.3	**Effluent.** 3. Monitor effluent from oil/water separator monthly for the following parameters prior to discharge into the environment: • COD (Chemical Oxygen Demand) • BOD (Biological Oxygen Demand) • TSS (Total Suspended Solids) • Oil & Grease • PH	Operation (monthly)	BPSPM, EAD	N.A.	Included in the annual O&M budget.
3.4	**Stack Emission and Ambient Air Quality** 4. Conduct stack testing within 6 months from date of commissioning of each turbine to verify manufacturer's air emission specifications and submit results to Manager, Environmental	Commissioning / Operation	EPM, BPSPM, EAD	N.A.	Included in the project cost.

No.	Action Description	Implementation Schedule	Responsibility	Capital Cost (US$)	Annual Recurrent Cost (US$)
	Monitoring and Assessment Branch of NEPA within 3 months of the stack emission testing.				
3.5	5. Conduct annual stack emission testing of NOx and PM to monitor compliance with Jamaican requirements and World Bank Group environmental guidelines.	Operation	BPSPM, EAD	N.A.	Included in the annual O&M budget.
3.6	6. Collect measurement data for ambient 1-hour SO_2 for at least 1 year starting May 2003.	Operation	BPSPM, EAD	US$70,000	Included in annual O&M.
3.7	7. If necessary, re-run the dispersion model for SO_2 using measured stack data and making comparisons with the measured ambient SO_2 data.	Operation	EAD	To be estimated.	N.A.
3.8	8. Evaluate the need and feasibility to strengthen ambient air quality monitoring program covering SO_2, NO/NO_2 and PM based on the analysis of 3.6.	Operation	EAD	To be estimated.	To be estimated.
	Noise.				
3.9	9. Conduct semi-annual noise evaluation at selected fence-line sites (plant boundary and 50m from the plant boundary) and other sites in nearby communities to verify the implemented attenuation measures are effective and required noise levels by the Jamaican requirements and World Bank Group noise guidelines are met.	Operation	BPSPM, EAD	N.A.	Included in annual O&M.
4	**Environmental Management [Corporate-wide]**				
	General.				
4.1	1. Complete the corporate environmental management procedure document to implement the Environmental Management System.	By December 31, 2003	EAD	N.A.	N.A.

No.	Action Description	Implementation Schedule	Responsibility	Capital Cost (US$)	Annual Recurrent Cost (US$)
5	**Environmental Mitigation [Corporate-wide]**				
5.1	**Air.** 1. Install ambient air quality network to measure SO_2, NOx and PM around Old Harbour Power Station to determine whether ambient air quality levels are in compliance with Jamaican air quality standards and whether additional mitigation measures are needed at Old Harbour Power Station to achieve compliance with Jamaican ambient air quality standards. If determined as needed, then, JPSCo will implement those mitigation measures.	Installment of ambient air quality network: By December 31, 2003	EAD	US$125,000	To be included in the annual operating budget.
5.2	2. Monitor development of the draft Jamaican Air Quality Regulations by NEPA and develop and implement Air Compliance Program as appropriate to ensure all parameters meet NEPA Standards and World Bank Environmental Standards for existing facilities .	Within 18 months from the finalization of the Jamaican Air Quality Regulations	EAD	To be estimated.	To be estimated.
5.3	**Soil and Groundwater.** 3. [2]Implement Remediation Project consisting of: • Design of Remediation Project • PCB Treatment & Disposal • Plant Improvement	By December 31, 2003 2003 2003 December 2003	EAD	 US$516,000 US$2,531,000 US$2,000,000	N.A.

[2] Remediation activities for Phase 1. PCB disposal scope for 2003 is for 5,781 equipment stored at the Washington Boulevard facility. Additional PCB transformers being retired from the system will be phased out under similar arrangements. The due diligence for the disposal of solid industrial waste (EIA etc.) including the feasibility for a landfill is currently being pursued. Decision regarding will be taken by mid year 2003.

No.	Action Description	Implementation Schedule	Responsibility	Capital Cost (US$)	Annual Recurrent Cost (US$)
	• Soil Remediation • Construction of Land Fill • Construction of Facility	December 2003 2004 December 2003		US$800,000 US$1,700,000 US$200,000 Sub-total US$7,747,000	
5.4	**Water.** 4. Design & install of Wastewater Treatment Systems at Hunts Bay Power Station and Old Harbour Power Station.	No later March 31, 2005	EAD	US$1,100,000	N.A.
6	**Environmental Monitoring [Corporate-wide]**				
6.1	**General** 1. Evaluate environmental performance of JPSCo annually by using Environmental Performance Indicators and comparing with international industry practice and identify opportunities for improvement.	Annually.	EAD	N.A.	N.A.
7.1	**Future Project Development.** 1. Ensure that future major generation, transmission & distribution projects are designed, constructed and operated in accordance with the Jamaican environmental requirements effective at the time of developing such projects and the World Bank Group environmental and social policies and guidelines effective at the time of signing the Loan Agreement as referred to in the definition section of the Loan Agreement. JPSCo is encouraged, but not obliged, to comply with World Bank Group environmental and	During the life of the loan	EAD	N.A.	N.A.

No.	Action Description	Implementation Schedule	Responsibility	Capital Cost (US$)	Annual Recurrent Cost (US$)
	social policies and guidelines prevailing at the time that future major projects are implemented.				
7.2	**Relevant Documents for Submission to IFC** 2. Submit the following documents to IFC: Bogue Expansion: a. Description of Environmental Management System at Bogue Power Station incorporating 120MW expansion. b. Environmental, Health and Safety Training Program for Bogue Power Station personnel for 2003 c. Emergency Response Plan of Bogue Power Station incorporating emergency response procedures for the 120MW expansion unit. d. Finalized water balance design specifications (quality, quantity) for the Bogue Power Station (including the 120MW expansion unit) and manufacturers guarantee on NO_x emissions and required volume of water injection for GT11, 12 and 13, demonstrating that the use of water injection using grey water from the NWC Sewage Treatment Plant at Bogue) or deep well is feasible to meet NOx emission limits of 530 ng/J for GT11 (20MW), 380 ng/J output and 80 ppm dry at 15% O_2 for GT12 (40MW) and GT13 (40MW). e. Noise evaluation report conducted after the	 Within 3 months from Phase II completion. Ditto. Ditto. Condition of Disbursement Within 3 months	EAD	N.A.	N.A.

No.	Action Description	Implementation Schedule	Responsibility	Capital Cost (US$)	Annual Recurrent Cost (US$)
	commissioning of GT12 and 13 as combined cycle demonstrating that noise requirements by Jamaican authorities and World Bank Group noise guidelines are met.	from Phase II completion.			
	f. Spill Prevention Control Plan	Ditto.			
	g. Waste Oil Management Plan	Ditto.			
	h. Environmental monitoring plan (stack emission, ambient air quality, liquid effluent, noise) detailing sampling points, measurement methods and monitoring frequency.	Ditto.			
	Corporate-wide				
	i. Corporate environmental management procedure document (updated)	Condition of Disbursement.			
	j. Ambient air quality monitoring plan at Old Harbour Power Station	Ditto.			
	k. EIA for the Land Fill under the Remediation Project	Within 1 month of completion.			
	l. Implementation completion report of the Remediation Project	No later than Jan 31, 2004.			
	m. Description and development plan of the Wastewater Treatment Plants at Hunts Bay Power Station and Old Harbour Power Station.	No later than March 31, 2005			
7.3	3. Submit Annual Monitoring Report to IFC using a form specified by IFC, confirming (i) compliance of the Bogue expansion unit with Jamaican environmental requirements, World Bank Group	Annually within 120 days after the end of calendar year.	EAD	N.A..	N.A.

No.	Action Description	Implementation Schedule	Responsibility	Capital Cost (US$)	Annual Recurrent Cost (US$)
	policies and guidelines and Environmental Action Plan, (ii) compliance of the JPSCo's operation with Environmental Action Plan.				