

## APPENDICES

With the Advisory Review of the Environmental  
Impact Statement for the West African Gas Pipeline

(Appendices 1 to 10)

## Appendix 1

### Letter of EPA, Ghana, dated 29 February, requesting advice on the review of the draft Environmental Impact Statement (EIS) for the West African Gas Pipeline

Our Ref.: CE 447/02/35

29<sup>th</sup> February 2004

HE The Ambassador  
Royal Netherlands Embassy  
Accra

Attn.: Mr. Andre Vermeer

Dear Sir,

#### **REVIEW OF ENVIRONMENTAL IMPACT STATEMENT WEST AFRICAN GAS PIPELINE PROJECT**

We have received the draft Environmental Impact Statement on the proposed West African Gas Pipeline Project in line with the requirements of the Environmental Assessment Regulations 1999, LI 1652.

As required under the regulations, the Agency has the responsibility of reviewing the statement to ensure that adequate safeguards are incorporated in the design and implementation of the proposed project and grant an environmental permit for the Ghana segment of the project (although trans-boundary issues and impacts would also be considered if they come up in the review).

The strategic nature of the proposed project, the potential trans-boundary impacts and the strong interest of the public requires that a special inter-sectoral team be composed to undertake the review supported by international expertise and experience .

In view of this we wish to request for technical assistance and support from the Netherlands EIA Commission through your office to review this document.

We wish to propose that the review be done jointly with the Netherlands EIA Commission. This will ensure quality assurance and also serve as a capacity building measure for our technical review team.

The team is expected to complete the review of the draft by the 24<sup>th</sup> March 2004 and comments sent to the proponents for further action.

We hope our request would be granted and we look forward to working once again with the Netherlands EIA Commission on this important exercise.

Yours faithfully,

J. A. ALLOTEY  
Executive Director

## **Appendix 2**

### **TERMS OF REFERENCE**

**for the**

### **Technical Assistance from the Netherlands Commission for EIA to EPA-Ghana for the Review of the Draft Environmental Impact Statement on the West African Gas Pipeline Project**

#### **1.0 Introduction**

The Environmental Protection Agency has received the draft Environmental Impact Statement on the West African Gas Pipeline Project in fulfillment of the requirements of the Environmental Assessment Regulations 1999, LI 1652.

The proposed project involves the construction of an 8 inch (in) to 30in (20.3cm to 76.2cm), 690.5 kilometers (km) (429 miles) dry gas pipeline transmission system, on-shore and offshore from Nigeria to Ghana. The onshore pipeline will connect to the existing Escravos – Lagos Pipeline at the Alagbado “Tee,” north of Lagos, Nigeria and extend 56km (35 miles) to a compressor station at Badagry Beach in Nigeria, proceeding across Badagry Creek for 2km (1.2 miles) to the shoreline. The offshore pipeline will be at distances from 16km (10 miles) to 25km (15 miles) from shore in water depths from 24m (78 feet (ft)) to 72m (236ft). Single lateral connections will be made to bring gas on-shore in Benin, Togo, and Ghana (with two delivery points). These laterals will extend onshore between 110m (360ft) to 520m (1706ft), except in Benin, 5.1km (3.2 miles).

Apart from fulfilling our national requirements, the EIA also took into account the West African Gas Pipeline Treaty (signed on 31 January 2003 in Dakar) that committed each State to prepare and present to its Parliament enabling legislation to provide certain legal support for an International Project Agreement (IPA) signed between the states and West African Pipeline Company Ltd.

The report covers an assessment of the Ghana section of the pipeline and is in three volumes namely:

- Volume 1            -        Executive Summary and Main Report
- Volume 2            -        Appendices
- Volume 3            -        Appendices

The following reports have also been submitted for our reference:

- Country Reports for Benin, Togo and Nigeria and
- Regional Report that summarizes all the reports of the 4 countries (Ghana Benin, Togo and Nigeria)

There is also CD copy of all the above reports.

As required under the regulations, the Agency has the responsibility of reviewing the statement to ensure that adequate safeguards are incorporated in the design and implementation of the proposed project and grant an environmental permit for the Ghana segment of the project (although trans-boundary issues and impacts would also be considered if they come up in the review).

In view of the strategic nature of the proposed project, the potential trans-boundary impacts and the strong interest of the public a special inter-sectoral team has been composed to undertake the review. The team include representatives from the following institutions:

- Ministry of Health
- Ghana Energy Commission
- Ghana National Fire Service
- Ghana Institute of Engineers
- Kwame Nkrumah University of Science and Technology
- Ministry of Energy
- Centre for Scientific & Industrial Research (CSIR)
- Environmental Protection Agency (Regional & Headquarters Staff)
- Ministry of Food & Agriculture

To facilitate effective review the team has been grouped as follows to deal with various aspects of the report:

- Group 1 - Public Health and Safety
- Group 2 - Project Alternatives
- Group 3 - Socio-Economic
- Group 4 - Ecology

The outcome of the review exercise would be a set of comments and recommendations to the Executive Director of the EPA for consideration and onward submission to the proponent to either submit a revised environmental impact statement, conduct such further studies as the Agency considers necessary or to finalize the report for an environmental permit to be granted.

The review of the proposed project EIS poses a great challenge to the Agency in view of the existing limited local capacity and experience in dealing with gas pipeline projects. It is therefore important that the review team is supported by external expertise and experience. To obtain this support this request has been prepared for Technical Assistance from the Netherlands EIA Commission through the Royal Netherlands Embassy in Accra.

## **2.0 Objectives of the Technical Assistance**

- To enhance the review of the draft Environmental Impact Statement on the West African Gas Pipeline Project
- to advice and support the review team

- To enhance the review capacity of the Agency and its stakeholders
- To enhance the credibility of the review process both locally and internationally
- To ensure the quality of the review process

### **3.0 Scope of Work**

The Technical Assistance is expected to cover the following tasks:

- Participate in review meetings of the inter-sectoral team
- Undertake field visits with inter-sectoral team
- Comment on the output of the inter-sectoral review team
- Prepare a report on their observations from the review and its output
- Comment on the review process and advise on how similar exercises in the future may be conducted
- Review the draft EIS and advise the Agency on its shortcomings
- Provide technical support to the review team

### **4.0 Duration of the Technical Assistance**

The duration of the Technical Assistance is 7 days which will cover the following:

- 3 days for review
- 2 days for site visits
- 2 days for report writing

The services of the technical assistance team would be required between April 18-25<sup>th</sup> 2004.

### **5.0 Expected Output**

- (i) The enhancement of the review capacity of the Agency and its collaborators in pipeline project EIS
- (ii) Credible EIS Review Report with full benefit of international experiences and lessons
- (iii) Enhanced Collaboration with the Netherlands EIA Commission

## **6.0 Reporting Requirements**

The Technical Team shall be responsible for the preparation and submission of a report to the EPA commenting on the review and setting on recommendations for future reviews within 7 days of completion of the assignment.

## **7.0 EPA's Input**

The EPA input to the process will be as follows:

- payment of the review costs of the local staff (inter-sectoral team and secretarial support)
- cost of the field trips to relevant project sites in Tema and Takoradi
- organization and servicing of review meetings
- provision of transport for Technical Team

## Appendix 3

### Project Information

**Proposed Activity:** The West African Gas Pipeline Company Ltd. (WAPCo), the project proponent, intends to construct an onshore and offshore gas pipeline transmission system that will deliver natural gas from Nigeria to commercially viable markets in Benin, Togo and Ghana.

WAPCo was formed in May 2003. The members are Chevron Texaco Ltd. (41,87%), Nigerian National Petroleum Corporation (25,25%), Shell Overseas Holding Ltd. (18%) and the Volta River Authority (16,38%).

The proposed project involves the construction of a 20.3cm to 76.2cm, 690.5 km dry gas pipeline transmission system, onshore and offshore from Nigeria to Ghana. The onshore pipeline will connect to the existing Escravos-Lagos Pipeline at the Alagbado "Tee," north of Lagos, Nigeria and extend 56km to a compressor station at Badagry Beach in Nigeria, proceeding across Badagry Creek for 2km to the shoreline. The offshore pipeline will be routed at distances from 16km to 25km from the shore in water depths ranging from 24m to 72m. Single lateral connections will be made to bring gas onshore in Benin, Togo, and Ghana (with two delivery points). These laterals will extend onshore between 110m to 520m, except in Benin, 5.1km.

**Categories:**

Mineral resources and mining: oil and gas DAC/CRS code: 32262

**Project numbers:**

Netherlands Commission for EIA: 054

Environmental Protection Agency – Ghana: CE 447/02/35

**Procedural information:**

Request for advisory services from EPA – Ghana: 29 February 2004

Endorsement by RNE Ghana: 3 March 2004

Endorsement by DGIS, The Hague: 12 March 2004

Receipt of draft EIS from EPA Ghana by NCEIA: 27 February 2004

Site visit to Ghana by NCEIA Working Group: 19 – 26 April 2004

(Final Draft) Advisory Review submitted: 29 April 2004

**Significant details:** The Commission is of the opinion that in general the EIS in general is of good quality. The thoroughness of the study and the attempt to be comprehensive, especially for a project of this size, is appreciated. However, the Commission observes a number of deficiencies, that apply both to contents and process. The Commission recommends that the proponent addresses some of these shortcomings **before** decision making on license granting. The Commission observes that other information gaps can be addressed **after** decision making on the licence, can be introduced as preconditions in the license and should be addressed before the start of the construction.

Issues to be supplemented in the final EIS can be summarised as:

- the inclusion of maps of the pipeline route, including lateral pipelines, with the local characteristics offshore (bathymetry, sediment characteristics) and onshore (topography, sediments characteristics).
- a quantitative risk assessment for the safety of the offshore pipeline areas, to the satisfaction of and in consultation with EPA and the Ghana Ports and Harbour Authority, to be able to draw conclusions with respect to:
  - in which areas the pipeline should be placed in the seabed instead of on the seabed (not a choice between 8 or 30 m)
  - at which depth the pipeline must be placed for sufficient protection
  - and also whether or not a protection layer is to be placed on top of the pipeline in the seabed (sand, gravel, rock materials).
- developing an alternative most friendly to the environment consisting of more environmentally friendly shore-crossing of pipelines, work methods with respect to placing the gas pipeline in the seabed which will have less environmental effects on the marine environment and a more common solution ensuring the stability of the pipeline by means of peak shaving instead of placing sand bags or concrete in offshore valleys.
- To enable verification of the risk analysis procedures followed by WAPCo and to enhance responsible decision making on the subject of safety the underlying facts are to be included in the EIS as well as the results of the analysis.
  - Location of valves, performance indicators (reaction time, maximum planned duration of uncontrolled releases) of emergency shutdown systems and SCADA systems.
  - Data and facts on incident scenario's including: type of incident, potential effect distances, likelihood, required emergency response.
  - Detailed topographical maps of the areas around the ROW and R&M stations.
- assurances for the prevention of the development of conflicting forms of land use near the gas pipeline and R&M station or the encroachment on buffer zones by other users. This assurance could take the form of spatial planning decisions, including those addressing human populations, or the establishment of buffer zones.
- an indication on the Emergency Response capacity and capabilities that WAPCo will establish in Ghana as well as the additional demands to be made on Government or Private Emergency Response Organisations.

Recommendations for licence preconditions are:

- the inclusion of annual reporting obligations on the progress of the Environmental Management Plan (EMP) and periodic updating of the EMP.
- the accredited certification of the Health Safety and Environmental Management System.
- the guaranteed application a very accurate method with respect to the discharging of the test water, and on minimising the effects of the discharged water on the local marine environment.



Recommendations for stakeholder consultation are:

- a second consultation as soon as the final decisions of the project have been taken, and practical issues are better defined, to be followed by another round during the construction phase.
- a permanent structure for the operation phase in order to be aware of any issues cropping up and to be activated in case of urgent matters, and when new developments come up.

In relation to EPA's review process and outputs the Commission's recommendations can be summarised as:

- the review team should continue to function to be able to perform a review of the supplementary information and to review the final Environmental Management Plan.
- the review could gain in efficiency if the review team members would receive clear ToR indicating for instance that the groups should concentrate on major shortcomings that are relevant for decision making. Each group should express a clear opinion in terms of whether the EIS is of sufficient quality or not, which issues should be repaired before decision making or which issues should be put as conditions to the license.

**Members of the Working Group:**

Mr. K. J. Beek (Chairman)

Mr. G. C. De Jong (Civil engineering, Environmental and Safety issues)

Mr. R. W. Van Oostrum (Marine ecology and Dredging)

Mr. C. Geerling (Ecology and Social impacts)

**Secretary of the Working Group:** Mrs. I.A. Steinhauer

## Appendix 4

### West African Gas Pipeline Project EIS Review

#### - Programme -

No	Day	Date	Activity	Time	Venue	Output
1a	Tuesday	20 <sup>th</sup> April 2004	<p><b>Netherlands Embassy</b> Mr. Mar van der Gaag, counselor</p> <p><b>EPA</b>, Mr. Daniel Amlalo, environmental, marine and coastal zone management, deputy Director, Mrs. Margareth Ahiadeke, legal officer, Mrs. Audrey Quarco, EIA, Mr. Daniel Aggrey, socio-economist, Mr. Wilson Tamakloe, natural resources, Mr. William Agyeman Bonsu, climate change and Mrs. Esi Annan, University of Science and Technology, Mr. Kwame Kwarteng, Ghana National Fire Service.</p> <p><b>WAPCO</b>, Mrs. Cynthia Omaboe, Government Relations Representative, Mr. Kwasi Prempeh, community relations and Prof.... local EIA consultant</p>	<p>9.00am</p> <p>10.00am</p> <p>11.00am</p>	Accra	<p>Familiarization with site conditions</p> <p>Stakeholder concerns</p>
1b	Tuesday	20 <sup>th</sup> April 2004	<p><b>Site Visit to Tema</b> by entire EPA review team (composition see app. 4) together with NCEIA team</p> <p><b>EPA</b>, meeting with Mr. Jonathan Allotey, Director EPA, Mr. Ebenezer Sampong, EIA and Mr. Daniel Amlalo</p>	<p>12.00pm-4.30pm</p> <p>4.30pm-6.00 pm</p>	<p>Tema</p> <p>Accra</p>	<p>Familiarization with site conditions and stakeholder concerns</p>
2a	Wednesday	21 <sup>st</sup> April 2004	<p>Visit by NCEIA to <b>USAID</b>, Mr. Cleveland Thomas</p> <p>Meeting with <b>4 review team of EPA</b></p>	<p>9.00am-10.30am</p> <p>10.30am-14.30pm</p>	<p>Accra</p> <p>EPA Head-office</p>	<p>Familiarization with site conditions and</p> <p>Stakeholder concerns</p>

2b	Wednesday	21 <sup>st</sup> April 2004	Review Groups Meetings EPA team  <b>Ghana Ports and Harbour Authority</b> , Mr. Harry Barnes-Dabban, estate and environment manager, and Mr. Victor Jonah, Harbour master	9.30am–4.30 pm  15.30pm–18.30pm	EPA Head-office  Tema	Draft Group Reports
3a	Thursday	22 <sup>nd</sup> April 2004	Review Groups Meetings EPA team  <b>World Bank</b> , Mr. Edward Dwumfour, natural/environmental resource management specialist, Mr. Max Carlson, Ghana country director  <b>Friends of the Earth</b> Ghana, Mr. Noble Wadza, programme coordinator and Mr. George...	9.30am–12.30 pm  9.00am–11.00am  11.30am–13.00pm	EPA Training School Amasaman  Accra  Accra	Group Reports
3b	Thursday	22 <sup>nd</sup> April 2004	Plenary Sessions, presentation and comments group 1, health and safety	2.30pm–4.30 pm	EPA Training School Amasaman	draft review comments
4	Friday	23 <sup>rd</sup> April 2004	Plenary Sessions, presentation and comments group 2, 3 and 4	10.30am–3.30 pm	EPA Training School Amasaman	Final draft review comments

5	Saturday	24 <sup>th</sup> April 2004	Site visit NCEIA team and EPA staff, Mrs. Irene Heathcote and Mrs. Audrey Quarcoo and Mr. Kwasi Prempeh WAPCO, and Volta River Authority, Mr. S. Kwofie	6.00 am-6.30pm	Takoradi	Familiarization of site conditions
6	Sunday	25 <sup>th</sup> April 2004	Report writing NCEIA	8.00 am-9.00 pm	Accra	
7	Monday	26 <sup>th</sup> April 2004	Final report writing  Debriefing at EPA  Debriefing at Netherlands Embassy	8.00 am-10.30 am  14.00 pm-16.00 pm  16.00pm-17.00 pm	Accra	

## Appendix 5

### WEST AFRICAN GAS PIPELINE PROJECT COMPOSITION OF REVIEW TEAMS

	AREAS	REVIEW TEAM	
1.	Public Health and Safety (Group 1)	Dr. Edith Clarke, Martin Asare DO1 Kwame Kwarteng Wilson Tamakloe	Ministry of Health Energy Commission Ghana National Fire Service EPA
2.	Project Alternatives (Group 2)	Dr. JEK Annan Dr. Esi Annan Philip Acquah Quaye-Foli William Agyeman Bonsu	Ghana Institution of Engineers University of Science & Technology EPA Ministry of Energy EPA
3.	Socio-Economic (Group 3)	Margaret Ahiadeke C. M. K. Normeshie E. Appah-Sampong Daniel Aggrey	Legal Officer (EPA) Center for Scientific  &Industrial Res EPA Socio-Economist (EPA)
4.	Ecology (Group 4)	Lambert Faabeluon (EPA) Irene Heathcote D. S. Amlalo Mrs Mensah Audrey Quarcoo	EPA EPA EPA Ministry of Food & Agriculture (Fisheries) EPA

The following chapters should be considered be by all reviewers:

- Chapter 1 & 2
- Chapter 5.5
- Chapter 6.1-6.4
- Chapter 6.6.2
- Chapter 7
- Chapter 8.1-8.9
- Chapter 9
- Appendix5 E

The following chapters should also be reviewed by the various groups:

Group 1 Chapter 6.5.3, Chapter 6.9.3  
Chapter 5.3, 5.4, 5.5  
Chapter 6.1, Appendix 6C  
Chapter 8, Chapter 6.8

Group 2 Chapter 6.6. Chapter 6 A & 6B, 6.7, 8.10.5  
Appendix 2, 6A & B & 8B

- Group 3 Chapter 6.5.2, Chapter 8.6.7  
Chapter 5.2, 5.5, 6.5.2, 6.9.2, 8.10.6, 8.10.7  
Appendix 5D, 5E
- Group 4 Chapter 5.1, 5.5  
Chapter 6.5.1, Chapter 6.9.1  
Chapter 8.10.1 8.10.2, 8.10.3, 8.10.4  
Appendix 5A-C

## **Appendix 7**

### **List of documents**

- Ghana EIA report, volume I, II and III, December 2003
- Regional EIA report, volume I, II and III, December 2003
- Summary of WB comments, April 2004
- Questions and answers document by WAPCo, on legal and commercial, HSE, socio-economic, external affairs and engineering and construction issues, April 2004
- WAGP fact sheet, April 2004
- e-mail correspondence (WAPCo answers to questions raised by the Commission) 22-4-04
- Results of public hearings held at Takoradi, Tema and Accra, March 2004
- Front End Engineering Documentation, 2003
- Results of review findings of EPA review team, group 1, 2, 3 and 4

# **Appendix 8**

## **Pipeline Buffer Zones**

### **1. Introduction**

Countries and cultures differ and so do the ways countries handle buffer zones or safety zones along gas pipelines and related facilities. A buffer or safety zone is defined as a controlled zone outside the Right of Way. Safety Zones are enacted both on land and off-shore.

### **2. On land**

In principle the buffer zone is controlled to fulfill either or both of the following two functions:

- Protection of the pipeline against damage by outside force (digging, use of explosives, drilling etc).
- Risk reduction to vulnerable objects such as residential area's, hospitals, schools etc.

Two approaches are used to determine these zones:

- Designated Safety zone
- Risk based Approach

#### **2.1 Designated Safety Zone:**

The width of the safety or buffer zone varies considerably from country to country. In Canada the width is set at 30 meters on both sides of the ROW, in the Russian federation safety zones of 600 meters have been reported (albeit in a earthquake prone area) for the Tunkinsky valley.

#### **2.2 Risk based approach**

The United States use a risk based approach to pipeline safety. The safety requirements of a pipeline are determined by its proximity to residential area's and vulnerable objects such as schools, hospitals etc. within a distance of 660-1000 feet. The US has a well established gas pipeline grid which is currently undergoing revision and upgrading. The degree of upgrading requiring is dependent on the risks of the pipeline for its surrounding area's.

In the Netherlands a quantitative risk approach is used. Individual and Societal Risk are calculated and compared to quantitative standards to determine safety distances to residential area's and vulnerable objects.



### **3. Off shore**

To a certain extent safety zones of 500 m along the ROW are also instigated off-shore. In coastal zones instructions to fishermen, shipping in the form of no access zones or no anchorage zones and sandmining areas are issues. Also these zones have to be included on nautical charts revisions. In the U.K. no access zones have been enacted around off-shore installations. This also has been done by the US coast Guard.

### **4. Further Information**

Canada Safety Zone: National Energy Board:

[www.neb-one.gc.ca/safety/livwork\\_e.pdf](http://www.neb-one.gc.ca/safety/livwork_e.pdf)

US Department of Transportation, Research and Special Programs Administration, office of pipeline Safety

[www.ops.dot.gov](http://www.ops.dot.gov)

UK: Notice to fishermen

[www.hse.gov.uk/pubns/indg189.htm](http://www.hse.gov.uk/pubns/indg189.htm)

# Appendix 9

## Accreditation of Management Systems

### Introduction

Organisations of all kinds, WAPCo amongst them, are increasingly concerned to achieve and demonstrate sound environmental performance. They do so in the face of a general concern from interested parties about environmental matters and sustainable development, as well as increasingly stringent legislation.

WAPCo has included an Environmental Management System in the EIS as one of the safeguards which will assure a sound environmental performance. For a number of identified HSE risks the Environmental Management System is proposed as a mitigation measure.

### ➤ International Standards for Management Systems

A number of international standards has been developed for this type of management systems, the most influential standards by the International Standards Organisation (ISO) part of the World Trade Organisation. These standards are:

- ISO 9001 : 2000 Quality Management Systems
- ISO 14001 : 1996 : Environmental Management Systems
- ISO 18001 : Occupational Health and Safety Management Systems (OHSAS)

In the EIS WAPCo refers to the ISO 14001 and 18001 standards, which will form the basis for the WAPCo Environmental Management System.

### ➤ International Standards organisation: ISO

The ISO is a multinational organisation which dedicates itself to the development of international product and management standards with the objective to minimise obstacles for global trade.

Its procedures are similar to other multinational organisations, with committees, multinational decision making procedures and a governing body in which all nations (at least those wishing to attend) are represented.

### ➤ Accreditation Bodies

Accreditation bodies, which in many nations have official legal status, oversee the functioning of independent validation and verification. Examples of Accreditation bodies are:

- UKAS (United Kingdom)
- RvA (Netherlands)
- ANSI-RAB (USA)

Validation and verification of management systems is done by certifying organizations

➤ **Certifying Organisations**

Certifying organisations are organisations which have received official permission (accreditation) to declare conformity of an organisations management system with the international standard.

Examples of internationally recognised certifying organisations are:

- Det Norske Veritas
- Lloyd's Register
- ABS
- Veritas

These organisations can independently verify the (continued) compliance of management systems with the international standard.

Certification by a recognised organisation demonstrates compliance with the international standards.

➤ **Certification process:**

A certificate demonstrates the compliance with the international standards, in the case of WAPCo ISO 14001 and ISO 18001. A certificate is valid for a limited period of three years. After three years the organisation will have to be fully reviewed and compliance demonstrated again. During the three years surveillance visits (with a minimum of one per year) have to be carried out to demonstrate continued compliance with the International Standard. Non-compliance can lead to the revoking of certification.

Impartiality and correctness of the reviews (or audits) is guaranteed by supervision of the Accreditation Body. Rules have been developed to ensure proper auditing (Guide 66).

➤ **EMAS**

In the European Union the EMAS system has been introduced as an Environmental Management Standard. EMAS is fully comparable to the ISO 14001 standard, but adds two obligations:

- Public annual Environmental Reporting
- **Verification and validation of the Environmental Report by independent auditors.**