

APPENDICES

**With the Advisory review of the environmental
impact assessment of the Ankobra Petrochemical
Plant in Ghana**

(appendices 1 to 6)

APPENDIX 1

Letter from the Environmental Protection Agency dated 26 October 2000 in which the Commission has been asked to submit an advisory review.

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Environmental Protection Agency

P.O. Box M326
Ministries Post Office
Accra, Ghana.

Our Ref: CE. 143/01/44

October 26, 2000

H. E. THE AMBASSADOR
ROYAL NETHERLANDS EMBASSY
ACCRA

Attn: Mr. André Vermeer

Dear Sir,

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**REQUEST FOR INDEPENDENT REVIEW OF A PETROCHEMICAL
EIA REPORT BY THE NETHERLANDS EIA COMMISSION**

We wish to express our sincere gratitude to the Royal Netherlands Embassy for the continual support to the Environmental Protection Agency, especially in the area of EIA capacity building in Ghana. We greatly value your willingness to assist the Agency whenever necessary.

We have received and reviewed an Environmental Impact Assessment (EIA) Report on a proposed Petrochemical Refinery Project to be located within a proposed Export Processing Zone at Sekondi, in the Western Region of Ghana. It has however, become necessary to seek an independent review opinion and advice on the project EIA, in order to facilitate the necessary informed and competent decisions on the EIA of the Ankobra Resources Petrochemical Project.

We wish to solicit the assistance of the Netherlands EIA Commission in this respect. We would therefore be grateful if the Royal Netherlands Embassy could request the Commission to assist the Agency, in view of their far reaching experience in EIA review.

We submit under cover of this letter a copy of the EIA Report for the requested independent review consideration. We would wish to know our obligation – financial or otherwise in this respect so we can arrange to settle it.

Thank you for your usual co-operation.

Yours faithfully,

DR. P. C. ACQUAH
EXECUTIVE DIRECTOR

cc: The Hon. Minister, Ministry of Environment, Science & Technology, Accra

APPENDIX 2

Letter from the Embassy Accra dated 15 December 2000 in which the Embassy endorses the request for advice by EPA

Commissie voor de m.e.r. OS	
Legalisatie datum:	20 december 2000
Legalisatie nummer:	519-00
Legalisatie plaats:	062-004
Legalisatie naam:	SH, P



Ambassade van het Koninkrijk der Nederlanden
Neda

Ministerie VROM,
MER Commissie,
T.a.v. Dhr. Arend Koolhof,
P.O. Box 2345,
3500 GH UTRECHT

Royal Netherlands Embassy
Development Section
89, Liberation Road
P.O. Box 3248
Accra
Ghana

Date 15 December 2000
Our ref. ACC/OS/TD-ML/482/00
Page 1/1
Encl. 1 Copy letter EPA to RNE-Accra,
1 Copy letter RNE-Accra to EPA.
Re EIA Ankobra Petrochemical Plant, Ghana
Cc DGIS/DML; Mr. Henk van Trigt
MEST/EPA; Dr. P.C. Acquah

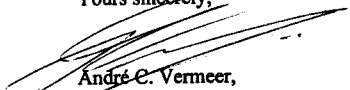
Contact André C. Vermeer
Tel. 00 233 21 773644/231991
Fax 00 233 21 773655
Email Vermeer@acc.minbuza.nl

Dear Mr. Koolhof,

With reference to the request submitted to this Embassy by the Environmental Protection Agency (EPA) of the Ministry of Mines, Environment, Science & Technology (MEST) of the Government of Ghana regarding the endorsement by this Embassy of assistance by the MER Commissie to review the EIA report on the project "Ankobra Petrochemical Plant" (see enclosed copy of letter by EPA with ref: CE.143/01/44), as well as our discussion of this issue by telephone on 10.11.2000, I hereby would like to inform you that this Embassy has no objection to such assistance being given. I remark that it is understood that this involvement of the MER Commission will have no financial consequences with respect to the ongoing bilateral support programme of the Development Section of this Embassy .

This Embassy appreciates this initiative by the EPA and the MER Commission and I would like to wish you every success for a satisfactory completion of this endeavour .

Yours sincerely,


André C. Vermeer,
Advisor Environment,
Development Section.

APPENDIX 3

Project information

Proposed activity: Construction of a Petrochemical Refinery Project to be located within a proposed Export Processing Zone at Sekondi, in the western region of Ghana.

Categories: petrochemical industry DAC/CRS code 35140

Project numbers: Environmental Protection Agency (EPA) CE.143/01/44; Netherlands Embassy ACC/OS/TD-ML/481/00; Commission for EIA 042

Procedural information:

Request from EPA for an advisory review: 26 October 2000
Endorsement by Netherlands Embassy: 15 December 2000
Visit of experts from Ghana: 4-10 February 2001
Advisory review submitted: 16 February 2001

Significant details: The Environmental Protection Agency received and reviewed the EIA-report for the Ankobra Petrochemical Plant and considered it necessary to seek an independent review opinion and advice on the project EIA, in order to facilitate the necessary informed and competent decision on the EIA-report. The assistance of the Netherlands EIA Commission was requested. It was agreed that the Commission for EIA would review the EIA report and would concentrate on (i) shortcomings, (ii) the risks of not providing insight into the effects of these shortcomings and (iii) recommendations to supplement lacking information.

No site visit to Ghana was planned but instead two experts from Ghana came to the Netherlands, joining the working group. This has been advantageous in two ways: first of all for EPA this offered the possibility to get acquainted with the way how independent review is performed in the Netherlands. Secondly, for the Commission the participation of the experts from Ghana was essential as they formed the 'eyes and ears' of the working group, able to provide project- and site specific information.

The Commission has the opinion that the EIA-report offers some relevant information for decision making. Particularly, the description on the refinery processes, the detailed monitoring plan, including organization, methods and timing and the indication to comply with clear and up-to-date safety and environmental standards by applying modern techniques can, can be mentioned.

The Commission is also of the opinion that the EIA-study has shortcomings on a number of relevant issues that can not enable informed decision-making.

- no hazards are assessed (spills, explosion, other incidents, etc.).
- quantitative data on emissions and waste management are hard to find, or may not be up to date. It is stated that impacts will stay below norms, but that does not provide any information on environmental loads.
- the description of the local environment (base line assessment) is insufficient or lacking. Also clear and relevant maps are lacking.
- since quantitative data on incidents and emissions is sparsely available or absent and the description of the receiving environment is very superficial, a proper risk assessment can not be made. This makes it impossible to assess the seriousness and significance of impacts.
- inadequate information is given on the social environment and the way this might be integrated with the construction and operation of the refinery, the generated transport and the expected workforce.

The Commission recommends that the relevant supplements be made to the EIA-report in order to have sufficient insight in the scope of the environmental and socio-economic impacts.

Members of the working group:

Mr W. Been

Mr J. Marquenie

Mr A. Pijpers (chairman)

Resource persons

Mr Y. Amoyaw-Osei (local expert)

Mr J. Richter (local expert)

Secretary of the working group: Mrs I.A. Steinhauer

APPENDIX 4

Working programme

Monday 5 February:

Whole day: Rotterdam

- 10.00 Board room Nerefco Europoort Oil Refinery, Rotterdam, explanation by Mr. de Vroome and Mr. Noordhoek on environmental aspects
- 11.00 Guided tour Refinery
- 12.30 Lunch
- 13.30 Introduction at DCMR, International Environmental Agency
- 14.30 Working group meeting, personal introductions
- 15.00 The Ankobra Petrochemical Plant, context, summary of recent developments, present status of the project
- 15.30 Discussion on first draft advice, working methodology, inventory of critical points to be addressed during this week.
- 16.00 Defining working programme for the rest of the week, tasks for each working group member

Tuesday 6 February:

Working group members preparing their first contributions for the review advice

Wednesday 7 February:

- 09.30 Working group meeting in Utrecht
- 12.30 Lunch
- 13.30 Revising and preparing advice

Thursday 8 February

Whole day: Schiedam

- 10.00 Arrival at NAM BU (Business Unit)-Olie, Schiedam
- 10.15 Departure to the oil location Rotterdam-2
- 10.45 Guided tour of Rotterdam-2 with explanation/escorted by Renee Bakker
- 11.15 Explanation of drilling process by Joop Marquenie and Henk Toerse with rig PT - 46 in the background
- 12.30 Lunch followed by an introduction of the NAM, Oil and Gas Exploitation Netherlands and the BU- Oil by Dick de Zwart and Andre de Wit
- 13.30 Working group meeting

Friday 9 February

Drafting of definitive review advice.

APPENDIX 5

Review framework/guidelines for EIA

Guidelines as prepared by the Commission will consist of the following subjects. These guidelines are used as a review framework for the review as described in paragraph 1.3

Structure of the guidelines

1. Context analysis and project objectives
2. Legislation and policy
3. Description of the intended activity and alternatives
 - 3.1 Description of the intended activity
 - 3.2 Alternatives
4. Description of the prevailing condition, autonomous development and impacts on the environment
5. Comparison of the environmental impacts for the intended activity and its alternatives
6. Remaining gaps in knowledge and post project evaluation
7. Presentation of the EIS

1. Context analysis and project objectives

Describe:

- the problems which are expected to be solved following implementation of the project, paying special attention to production scenarios in relation to (national and international) markets which have been or will be established;
- the objectives of the proposed activity in relation to the identified problems or rationale for the project

2. Legislation and policy

Describe:

- (proposals for) working procedures between relevant authorities regarding monitoring, emergency programmes, safety regulations, auditing;
 - present policies, regulations and standards governing environmental quality, health, occupational health, safety, protection of sensitive areas, endangered species, at company, national, regional/international levels;
 - the existing physical planning (if any) for the direct surrounding of the site;
 - formal and informal landownership (rights and expectations of local inhabitants);
 - legal requirements for public participation: how did affected groups influence the contents of the EIA-report, e.g. in project design and development of alternatives;
 - provision for compensation in case of negative impacts or calamities
- These descriptions must lead to the formulation of limiting conditions (standards, requirements, criteria) for the initiative.

3. Description of the intended activity and alternatives

3.1. Description of the intended activity

Location and logistics

Present on maps the site location and the distance to the inhabited area (number of people living in relation to distance). Justify the site location. Describe the route and the way of transport, supply, discharge and internal transport of crude (both for domestic and imported), products, chemicals, equipment and waste materials.

Describe (including all safety precautions):

- site construction (levelling, impermeable floors, water management);
- location, construction, operation of the different units and infield pipelines;
- design and operation of waste incinerator;
- design of storage facilities;
- number of people and housing during construction and operation phase;
- energy consumption;
- possible future expansions and modifications;
- commitments for decommissioning

Raw materials and products

Describe:

- quality and quantity of the crude (% of sulphur, mercaptans, hydrogen sulphide, heavy metals);
- type of (by) products (quantity and quality): fuel gas, naphtha, HVGO, LVGO, fuel oil and asphalt;

Production process

Give a process flow scheme of the production process and a description of the process operation, the maximum capacity and relevant technical specifications. Specific emphasis is required for process parts directly relevant for the environment like; heaters, boilers, fuel gas system, vacuum ejectors, process waterstripper, desalter and flare system.

Waste water (treatment and drainage systems)

Describe the waste/water streams (process water, rain water, domestic wastewater) as far as influenced by the intended activity (normal operation):

- the composition and quantity of the water streams (emissions of oil and grease, ammonia, suspended solids, phenolic compounds, sulphides, organic acids, nickel and other metals). These pollutants may be expressed in terms of biochemical oxygen demand (BOD) and chemical oxygen demand (COD);
- what kind of waste water treatment (purification) system;
- what kind of facilities are foreseen for the drainage of water during heavy rainfall or calamities (fire water);
- maximum oil spill scenarios (or under external safety/environmental care)

Emissions to soil and groundwater

Describe:

- possible groundwater contamination from leaks and spills, storage facilities, product loading areas and processing areas.

Emissions to atmosphere and groundlevel immissions

Describe:

- the used standards with a comparison to international standards;
- the expected emissions of hydrocarbons, carbon monoxide, sulphur oxides, nitrogen oxides and particles; furthermore the outlet concentrations in the flue gas of the heaters/boilers and the heights of the stacks and flare;
- the expected quantities to be flared;
- the ground level immission concentrations;
- the mitigating measures in order to reduce the emissions.

Noise

Describe:

- the emission relevant sources of the noise producing equipment (air fin coolers, pumps, heaters and flare) and the calculated noise level in the nearby Anoe village and the expected nuisance for the residents;
- frequency of peak levels;
- the mitigating measures to reduce the noise level. The used standards for noise production must be motivated.

Light

Describe:

- the expected normal and maximal flare gas scenario;
- the mitigating measures to reduce the hindrance for the residents Anoe village.

Waste

Describe:

- the total production of solid and liquid waste and its destination (tank bottom sludges).
- oil and water separators and pigging operations, household and sanitary waste);
- waste management system and criteria used for site storage, incineration, export out of the site etc.;
- waste treatment system (compactor, incinerator etc.) and how is proper function ensured;

Internal environmental care / monitoring

Describe:

- the environmental care system (good house keeping, periodic training, monitoring and safety procedures);
- monitoring of the work, waste handling and emissions (ambient air quality, ground and groundwater contamination, water quality, biological indicators);
- the maintenance system and equipment inspection procedures;
- availability of spare parts for equipment relevant for the environment;
- environmental auditing.

Occupational health / internal safety precautions

Describe:

- the organisation and policies of the consortium concerning labour safety;

External safety

Describe:

- the consortium's oil spill contingency plan;

- a worst case scenario (maximum credible accident) for fire and explosion with special attention to the storage of naphtha and LPG.
- a quantitative risk analysis in interaction with inhabitants and environment, including
- leakages from processes, storage and pipelines;
- the results of HAZOP's;
- the emergency plan and fire fighting facilities.

3.2. Alternatives

Alternatives

Describe:

- alternative processes;
- flocculation/flotation additional to the oil separator;
- closed liquid ring vacuum pumps instead of steam ejectors;
- ground flare instead of elevator flare;
- impermeable membranes and leak detection underneath the storage tanks;
- spatial/design alternatives: location of units and routing of pipelines
- supply and removal of products, materials and personnel
- seasonal alternatives in relation to biological factors such as spawning of fish;
- alternative routing/design of pipelines

Zero alternative or existing situation

To make a comparison with other alternatives, it is necessary to describe the situation if the intended activity will not take place. In case of Ankobra Petrochemical plant, this is the existing situation, which means no refinery. The existing situation and the impacts at the environment must be described and will be used as a reference situation. In particular the consequences on logistics (increase of shipped crude for export) and the air pollution (SO₂ emission) by the use of crude (mixed with diesel) versus the use of fuel oil by local customers must be described.

Mitigating and compensating measures

Describe:

- further decrease of noise nuisance (e.g. by screening noise sources like heaters and isolating screens);
- increasing stack heights in order to reduce immissions (or to reduce ground level concentrations);
- further safeguarding;
- the possibilities of creating a buffer zone;
- measures to prevent disturbance or pollution of valuable ecosystems;

4. Description of the prevailing condition, autonomous development and impacts on the environment

Prevailing condition of the environment

The prevailing condition of the environment in the study area (current situation) must be described as far as relevant for the forecasting of the environmental impacts of the intended activity or alternatives. This means that the existing environmental condition in the study area must be described for aspects as mentioned below. The study area is not fixed and differs for the different types of emission. The boundaries of the study

area need to be fixed depending on the extension of the worst case expected emissions to air, water and soil.

Autonomous development

The development of the environment of the study area must be described in case the intended activity will not be executed. The information about the autonomous development of the environment is important to get clear what the contribution of the refinery will be in relation to the expected environmental quality in the future in this region.

Impacts of the intended activities and its alternatives

The way impacts are described and measured must be motivated. Expected emissions can be predicted on basis of measured emissions for comparable installations. Special attention can be given to the emissions, which differ for the distinguished alternatives. It must be noticed in how far impacts are irreversible, temporarily or permanent and in how far cumulation occurs.

The Commission asks attention for the following aspects. All the aspects are mentioned once and if relevant they must be described for the current situation, the autonomous development and for the impacts.

- c = the current situation / prevailing condition of the environment
- a = the autonomous development
- i = impacts of the intended activities and its alternatives
- . = means no description asked for

Climatology and air quality

Describe:

- c/.i - relevant climatological conditions (e.g. prediction of air inversions) necessary to estimate the level of impact of air emissions;
- c/a/i - air quality on CO, SO₂, particles, NO_x and hydrocarbons. The possibility of obtaining information from the closest meteorological station must be investigated.

Hydrography, hydrology and surface water quality

- c/.i - Describe the relevant hydrological conditions of the Gulf of Guinea to estimate the level of impact of wastewater discharge and oil spills. A distinction must be made between surface water and ground water. The use of the water must be described (e.g. drinking water). The chance of flooding of the site by storm tides from sea or heavy rainfall must be described.

Soil and groundwater quality

Describe:

- c/a/. - the relevant geohydrological (aquifers) and soil conditions of the site in relation to potential oil and waste water spills and (if any) the disposal of solid waste;
- c/a/i - soil and groundwater quality of the site (storage tanks), and pollution as a result of oil leaks and spills, infiltration and percolation of rainwater at the site.

Noise levels

c./i Describe existing noise levels.

Biotic environment

c/a/i Considering the dispersion via waterways of large oil spills the following information must be mapped on a scale 1: 40.000 based on aerial photo's, description of all sensitive areas and objects along the Gulf of Guinea: estuarine, mangrove and wetland ecosystems (habitats and breeding grounds for fishes, shrimps, permanent and migratory birds and nesting beaches for sea turtles),

./i Describe potential (including worst case) impacts of oil spills on above mentioned ecosystems, flora and fauna.

Socio-economic environment

c./i. Map on a scale 1: 40.000 and describe all sensitive areas: areas with fishery and aquacultural activities, recreational sites, harbours, piers, industrial water intakes a.o.).

c/a/. Map on (a) blow-up map(s) of the refinery area and direct surroundings (2 km) and describe based on aerial photographs: existing forms of land-use e.g. agricultural areas per crop/ horticultural areas, aquacultural areas, areas with animal husbandry, residential areas, including population densities, aquifers and well fields, industrial areas, waste water and storm water drainage systems.

c./i. Describe present availability of piped drinking water in adjacent residential areas and alternative sources used in times piped water is not available.

./i Describe the possible economic spin off effects in the direct surroundings of the plant site (e.g. labour situation and infrastructure).

c./i. Socio-cultural information like sacred places / cemeteries.

c./i Gender issues if relevant.

5. Comparison of the environmental impacts for the intended activity and its alternatives

A comparison must be made in the EIA-study between the impact of developed alternatives, with the existing situation (eventually including autonomous development). The comparison must (also) be based on formulated standards and target values of the environmental policy. A sensitivity analysis must be executed with respect to the assessment criteria used.

6. Remaining gaps in knowledge and post project evaluation

A post project evaluation programme is necessary in order to be able to compare the predicted impact with the actually occurring impact. In the first place it must be investigated whether the actual environmental impact is more positive/ more serious or less positive / less serious than the predicted environmental impact and whether further measures must be taken. Secondly it must be investigated whether the gaps in knowledge and information mentioned in the EIA-study can meanwhile be supplemented. Finally, it must be investigated whether external developments give cause to adjust or review the decision taken.

7. Presentation of the EIA-study

The EIA-study must contain a summary in English. This has to be written in language that can be understood by the public as an independent document and form a good reflection of the contents of the EIA-study. Special attention must be paid to the presentation (on a map) of the intended activity and the most important alternatives as well as to the comparison of the alternatives.