Advisory Review of the EIA for offshore exploration in Blocks 16 and 19, Inhambase and Sofala Provinces - Mozambique -

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Advisory review of the EIA for offshore exploration in Blocks 16 and 19, Inhambane and Sofala Provinces, Mozambique

Advice submitted to MICOA/DNAIA by a working group of the Commission for Environmental Assessment in the Netherlands

the technical secretary

Reinoud Post

the chairman

Klaas Jan Beek

Utrecht, 29 September 2006

TABLE OF CONTENTS

Appendices

1. INTRODUCTION

1.1 The Initiative

On the first of July 2005, the government of Mozambique awarded to Sasol Petroleum Sofala Limitada (Sasol) and Hidrocarbonetos de Moçambique (ENH) a concession of 25 years to explore the maritime blocks 16 and 19 on hydrocarbons (oil and gas) and to harvest these products if any of the would be found. Blocks16 and 19 are located closely to the Bazaruto Archipelago. This archipelago has been declared national maritime park in 1971 with the objective to protect is natural beauty and exquisite and unique biodiversity.

The conservation of the park is already under stress of forces that aim to extend the existing and establish new tourism facilities in the park. Equally, extending presence of tourist from the main land threatens park conservation. The actual management plan of the park (Plano de Maneio, Parque Nacional do Arquipélago de Bazaruto) prohibits further growth of tourism in the park.

This situation is further complicated by conflicts between the tourist sector and the fishery sector in and around the park and by illegal fishing by trawlers coming from third countries. In addition, the 3000 strong local population in the park is, on a daily basis, living the (mostly negative) consequences of strict conservation.

In June 2005, MICOA decided to suspend decision making on approval of tourism development projects in the park until the Park Management Plan for Bazaruto would be revised. This would give time to consider the compatibility of the various viewpoints and the mid and long term objectives of park management with the planning of construction initiatives, their specific size, characteristics and impacts. This decision is in line with the intention of the Ministry of Tourism to revise the Management Plan for the Bazaruto Archipélago National Park.

Simultaneously, Sasol and ENH presented to the Government of Mozambique its intention to practice its concession rights and initiate exploration activities for oil and gas.

Aware of the confluence of economic interests in the same area and considering that Hydrocarbon prospecting and exploration activities may have a negative influence on ecosystems/marine ecology as well as environmental impacts on Bazaruto Archipelago National Park as a whole and, in addition, on tourism and fishery developments, it was recommended that in relation to the concession agreement mentioned above, the investors (i.c. Sasol and ENH), in order to secure sustainable development, should realise a Strategic Environmental Assessment oriented by MICOA.

Although the NCEA, on request of MICOA has drafted guidelines for the proposed SEA, it has become clear that Sasol and ENH would and will not do this SEA. Instead, Sasol and ENH presented in November 2005 draft

guidelines for the present EIA for seismic surveys, exploration well drilling and well testing in blocks 16 and 19[1].

1.2 Request for Advice

By email of 24th of August 2006, MICOA asked the NCEA to review the present EIA report (see annex 1).

1.3 Approach taken

The NCEA constituted a multidisciplinary working group for this review (see annex 2). The working group was composed of experts in the field of hydrocarbon exploration and production, marine and coastal ecology, socio economy and tourism. Four of the five members of the working group had visited the project area in September 2005 and have been involved in developing guidelines for the then intended SEA, so for this advisory review a site visit was not considered opportune.

As basis for this review, the NCEA has used the scoping report for this EIA and international standards on good EIA practice. The objective of this review is to advise whether the information contained in this EIA report is sufficient and of sufficient quality for decision making on granting the environmental permits.

In addition to performing an advisory review, the NCEA has taken the liberty to advise on the possible role Strategic Environmental Assessment could play in planning for the zone.

2. MAIN REVIEW FINDINGS

1. On most issues covered, the NCEA agrees with the findings of the peer review contained in the EIA report[2].

2. The NCEA holds the opinion that Sasol and ENH's decision to submit this EIA in support of a request for environmental licensing of the deep water prospecting only, was the proper decision. The NCEA finds the EIA report to provide insufficient information for decision-making on licensing of exploration activities in the shallow water prospect.

3. The NCEA observes that the present EIA does not include an Oil Spill Response Plan, a Cyclone Contingency Plan, a Safety Plan, a Monitoring Plan and a Compensation Plan. The NCEA holds the opinion that these plans are to be considered part of the EMP and that these plans should be finalised, published, reviewed and approved as part of the EIA procedure before the exploration activities in the deep water prospect are approved so that permit conditions can be developed taking the information contained in these plans into account.

[1] for the NCEA's review of these draft guidelines see http://www.commissiemer.nl/ncea/pdfs/adv/a59rr.pdf
[2] Points on which the NCEA has a different view are mentioned in this advisory review

4. In various chapters, in addition to commitments, the EIA report mentions requirements, intentions and recommendations with regard to the Environmental Management. The EMP does state in its heading 'the activities to be undertaken to mitigate Environmental Impact'. Formulations like these could leave doubts as to the extent to which Sasol and ENH commit themselves to implement these requirements, recommendations and intentions. The NCEA recommends the Government of Mozambique to require the proponent to firmly state its commitments with regard to these required, intended and recommended measures.

5. The EIA lists and shortly describes the International Agreements and Conventions to which Mozambique is party. The EIA does, however, not evaluate what implications of these Conventions and Agreements have for the proposed activity. Seen against the national and global importance of the scenic wealth and nature (species richness) of the area, the NCEA thinks such an evaluation should be included in the EIA, should be used to evaluate the adequacy of the EIA and should be used for decision-making on the environmental acceptability of the proposed activity.

6. With the exception of the issues mentioned under points 3, 4 and 5, the NCEA considers the information contained in the EIA report sufficient for decision making on the environmental licensing of the proposed exploration activities in the deep water prospect.

7. The NCEA observes that in the present EIA-process most actors [3] emphasise the necessity of applying strategic environmental assessment for decision making on the form and level of economic development that Mozambique wants to allow in and around the Bazaruto National Park. In line with these recommendations, the NCEA reiterates its support[4] for developing a sustainable development plan for the area (for the 4 coastal districts in Inhambane [5]) using Strategic Environmental Assessment methodology. The NCEA recommends that adequate funding be made available to the relevant authorities to realise such sustainable development planning with SEA.

8. In Mozambique many concession blocks (amongst which blocks covering the coastal zone) have not yet been awarded. Tourism development in these zones is still in its infancy but there seems to be great potential. Fisheries are everywhere along the coast and many of the coastal zones are of special and unique natural or scenic wealth. In more general terms, the NCEA recommends to organise a government debate (at CONDES or Council of Ministers level) in order to discuss whether possible conflicts between economic sectors and nature conservation warrant the formulation of criteria or policy for hydrocarbon concession granting, tourism development, fishery development and nature conservation in the coastal zones. If the answer is affirmative, the NCEA recommends the development of this coastal zone development policy in synergy with a Strategic Environmental Assessment.

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[3] Sasol and ENH, the EIA consultant, the peer-reviewer and many participants in the Public Participation process.
[4] given in its advice of April 2006 (see http://www.commissiemer.nl/ncea/pdfs/adv/a59rr.pdf)
[5] Machanga, Govuro, Inhassoro and Vilanculo districts

3. EXPLANATORY NOTES

3.1 General

- The EIA prepared by ERM and Consultec on behalf of Sasol and EHN comprises a comprehensive and detailed analysis of the interaction between Hydrocarbon (HC) exploration (including seismic activities) and the Biophysical, Social and Economic interests. The likely impacts have been identified and analysed, and the extent of the potential impacts described both before and with mitigation, as far as can be reasonably ascertained at this time. The EIA describes two areas of interest, the Deep Water and the Shallow Water.

- The NCEA is pleased to notice the application of the When, Where and How technique which has lead to particularly thorough analyses.

- The EIA process followed appears to have been thorough, open and consultative, with 11 public meetings, the establishment of an active "Stakeholder Forum" which met on seven occasions, peer review of draft reports, an accessible Background Document and a Non-technical Summary providing relevant information with an appropriate level of detail, and with all the reports and documents posted on a downloadable website.

- In view of the gas-prone nature of the expected Hydrocarbons, no oil is expected in this area. The exploration efforts are focused on gas and with the hope of some associated condensate.

- The present EIA report is only concerned with the exploration and appraisal part of activities. The production development activities will be dealt with in a separate EIA, as and when required. The issues concerned with subsidence have therefore not been covered in this EIA.

3.2 Notes on requesting licensing of the deep water prospect only

- The potential impacts and the requisite state of knowledge of the respective risks is clearly different between the deep water and shallow water areas. The biophysical and socio-economic components are closely interlinked. The two potentially most important socio-economic impacts are artisanal fisheries and tourism, both of which depend on healthy, clean and undisturbed ecosystems. This review supports the notion that the deep and shallow water interests be separated and treated differently. The risks inherent in both seismic and drilling activities in shallow waters, together with the lack of knowledge (levels of confidence) on these impacts, point to the need for further work in shallow waters at a number of levels, including: (a) a strategic assessment to assess present and future socio-economic trends within different sectors, and how integrated approaches may best optimise sustainable livelihoods at local level as well as contribute to the national economy, (b) a greater understanding (quantified) of likely impacts on the fisheries and tourism sectors, the resultant impacts on the local economy, and how the burden of these impacts will be distributed, (c) clarification and transparency on how compensation will be assessed and managed, and (d) in the unlikely event of a major oil spill during exploration, which will have serious medium and long-term

consequences for the artisanal fisheries and tourism sectors, an assessment and analysis of impacts, mitigation and compensation.

- The NCEA is pleased to notice that the application of the When, Where and How technique has lead to a particularly important and significant decision on the part of Sasol and ENH, to postpone seismic activities in the coastal waters above the 50 m isobath. It was decided that more baseline data was required to complete the present and incomplete dataset which is needed to operate in this shallow area without causing undesired damage. Monitoring of the effects of the seismic and drilling activities in the deeper offshore, will provide additional information on which a future decision on the shallow water activities can be based.

- Although the EIA does address the eventuality of early drilling in the Shallow Water area, which Sasol and ENH consider a possibility in case a suitable drilling rig becomes available, the description of the related activities is minimal and not location specific. The NCEA has the impression that in this eventuality, the choice of a drillable prospect has already been made on existing data and extrapolation of the geological model developed for the Temane field. Therefore, the drilling location is assumed to be known within a radius of some 2-3 km above the subsurface target (cf. Annex D, p. 8 where it describes the existence of a Shallow Water Prospect in water depths less than 10 m). This area should have been described in detail including the expected impacts of the operations on this environment.

- Baseline data have been described as detailed as possible. Gaps in knowledge have been identified and plans for further research and monitoring have been formulated. The areas where critical data is lacking are mainly concerned with the dugong population, the sensitivities of various organisms and ecological niches in the shallow, near-shore environment (< 50 m), including the coral reefs and sea-grass meadows. The baseline studies cover all characteristic physical and biological aspects (ecosystems, communities and species specific) of the hydro- and morpho-dynamic system of the Bazaruto area.

- The investigative method of Where, When and How was also applied to the socio-economic issues which play a major role in this context. Examples include the exclusion zone during seismic acquisition for artisanal fishing, sport fishing and scuba diving and development of the time window taking into account e.g. the whale breeding season (August to September for humpback whales). But also the drilling activities have been approached with this methodology which resulted in the definition of a time window for drilling activities during the tourist low season, the formulation of flight rules concerning minimal altitude, prescribed flight zones and areas to avoid etc.

3.3 Notes on the implications of Conventions

- The EIA intends to outline the legislative framework. Sasol and ENH operations must comply with the relevant legislation and the international conventions to which Mozambique is a signatory. Relevant conventions are listed (3-2) for dealing with oil discharge, contamination by ships etc. and

other international conventions. It is not clear how these conventions and their enforcement relates to the Sasol and ENH initiative.

- This is relevant when the Convention for the Protection, Management and Development of the Marine and Coastal Environment of the Eastern African Region, Nairobi 1985, and the African Convention on the Conservation of Nature and natural resources, 1968, are mentioned. Both these conventions ask for measures to be taken in view of the use of the living environment. It is not clear how these conventions are adhered to and what the consequences are for the Sasol and ENH initiative.

- In addition there is the National Legal Framework. Again, the contents are specified for petroleum Activities and for the Environmental legal Framework. As Category A project, the proposed Sasol and ENH activities in Blocks 16 and 19 require a full EIA. It is unclear how the legal framework, discussed in this chapter (3), is linked to the proposed activities of Sasol and ENH except as reflected in the general policy framework (Safety, Health and Environmental Policy) that is published at the end of the chapter (3) Legal Requirements (3-20).

3.4 Notes on the adequacy of the EIA for decision making on the deep water prospect (point 5)

- The level of confidence in the available information for the deep water areas is such that the inherent risks are considerably lower than for the shallow areas. Mitigation through strict application of the Environmental Management Plan should ensure that impacts to the fisheries, tourism and other sectors are minimised through seasonal scheduling, exclusion zoning, selection of flight corridors, etc.

- Although the activities will take place outside Bazaruto National Park, some of the impacts may extend into the Park. In the analysis of the operational drilling activities the visible and long-term effects of drilling mud discharge were considered. An important mitigating measure was proposed which involves the banning of all synthetic and oil-based drilling fluids. All wells are proposed to be drilled with Water Based Drilling Fluid at all depths. Top-hole is proposed to be drilled with seawater. Mud additives will need approval from the relevant authorities before usage. Mud additives are all proposed to be non-toxic. Ditch cuttings and drilling fluid will supposedly not be discharged overboard in the near-shore shallow waters. Discharge or accidental spills of diesel and chemicals are proposed to be mitigated in the Oil Spill Contingency Plan and EMP. The former plan is also proposed to cover condensate spills due to a blow-out.

- Horizon pollution is adequately covered by proposed planning of the drilling locations more than 10 km offshore the main land and the island of Bazaruto. Other mitigating measures proposed involve helicopter flight plans, avoidance tourist season etc.

- Although decommissioning of permanent installations is not relevant at this stage, the EIA does describe the abandonment of the exploration and appraisal wells in the shallow and deeper waters. In the shallow waters all wells are proposed to be abandoned below seafloor which precludes the possibility of fishing gear to become entangled in well structures. In the

deepwater where trawling nets can still be used the wells will be suspended and covered with a dome which will allow the nets the crawl across without damaging the nets or the wells. Suspended wells have the benefit of re-entry in case they need to be used as producing wells. This reduces cost and environmental impact because of a reduced number of new production wells.

4. RECOMMENDATIONS AND OBSERVATIONS FOR FURTHER DECISION MAKING

The EIA enumerates the Mozambican State's responsibilities for regulation, monitoring and enforcement of the proposed offshore activities.

- *As Mozambique has had no offshore hydrocarbon exploration activities in the past, the NCEA recommends that the EIA assesses the capability (knowledge and equipment) of the Mozambican authorities to adequately perform its tasks herein and, if necessary and as a service to the Mozambique government, proposes a plan for capacity development.*

The EIA does not state how liabilities for environmental clean-up and restoration and of social and socio-economic restoration in the case of disasters are covered.

- *The NCEA recommends that the coverage of such liabilities should be addressed in the EIA.*

In a previous non-published draft advice for ToR for this EIA, the NCEIA recommended that the *"EIA should present disturbance contours (if relevant, specific for the period of the year) for the most characteristic features of the Park: species such as, dolphins, turtles, dugongs, birds or fish as well as communities of species that include mangroves, sea grass fields, coral reefs, etc. and ecosystems like tidal flats and channels, shallow and deep waters (a-biotic) and their biotic communities. Also, the EIA was recommended to present disturbance contours for people that live and recreate in the Park. Where the impact of the drilling activities overlaps with these contours or infringe on the sensitivities of the physical and biophysical environment, the NCEA recommended to develop alternatives and mitigating measures".*

Though in the present EIA no disturbance contours are given for the various activities and affected species and habitats, the NCEA is of the opinion that sufficient data have been gathered that adequately describe the impact of the various activities on the environment in the Deeper Waters offshore Bazaruto island.

In the Shallow Waters however, where the impacts are regarded as potentially most critical, the technique of disturbance or impact contouring does make the impacts more visible on maps when applying GIS methodologies in quantitative or qualitative risk analyses and makes the alternatives more obvious. These techniques have not been used in the risk assessments chosen for this project.

A most relevant opportunity however, may develop in case Sasol and ENH are successful in acquiring a drilling rig for the Shallow Water (< 50 m). This

drilling opportunity is considered of such importance that the EIA indicates that the EIA procedures could be circumvented and drilling activities could commence without a proper assessment of the risks and impacts such activities impose on this most sensitive area. Sasol and ENH will most likely base the choice of a drilling location in this case on existing seismic data and geological interpretations possibly including the extrapolated geological model developed for the nearby Temane Field. Therefore, a prospect must have been chosen including a drilling location in a 2-3 km wide radius above the subsurface target, which is accessible for a Jack-Up rig, barge or pontoon. In view of the significant costs of such an operation, such plans must have a reasonable chance of success and it is therefore not understood why no mention of this drilling location/area was made in the EIA. The EIA could have focussed on this area instead of attempting to address the entire Shallow Water area as the area of concern.

The entire factor train of activities from floating in the JU rig with tugboats, describing the drafts and room to manoeuvre, the depths of the channels, timing and strengths of tidal currents, seabed morphology, presence of dugongs, sea grass meadows etc, etc, could all have been described for this specific location and transport route. The best surface location could have been chosen on the basis of a search area from which the prospect at 2000-2500 m depth could be reached. The overlapping impact contours would have allowed the formulation of alternatives or mitigating measures so as to optimise the choices to be made for successful entry to the location, drilling and exit from the location. As mentioned above, the effects of scouring by tidal currents can be severe. Protective measures in similar environments (Waddenzee in the north of the Netherlands) are common practice to prevent destabilisation of the drilling rig.

- *Therefore, the NCEA advises MICOA to prescribe this additional and location specific impact study before consenting to a drilling permit request from Sasol and ENH ahead of the finalisation of this ongoing EIA procedure and include a Safety case with respect to the scouring issue described above.*

The majority of the safety aspects however, have received the attention they deserve. Relevant literature research has been used; adequate safety measures are planned which are in accordance with international safety standards applicable in the offshore industry. Emergency response procedures and an Oil Spill Response Plan are recommended to be developed before licensing according to the IPIECA Guidelines (1993) which will link with the Mozambican National Oil Spill Contingency Plan. In case of a blow-out (chance 1:25.000 for a loss of 3750 bbls, EPA Bull. 853, 2001)), spill dispersants will not be used in water less than 100 m depth. Mechanical equipment will then be used to clean the floating debris of the condensate. Oil is not expected.

- *The response options are limited. Oil spill scenarios have been developed using DELFT3D-FLOW and DART and ADIOS (2000) software and the NCEA advises to apply this technique in case of a real blow out and feed the actual data into the model to manage the clean-up as efficiently as possible.*

Dispersal modelling of drill cuttings and plume of discharged drilling fluid at the end of operations, resulted in the mitigating decision not to discharge any cuttings or drilling fluid in shallow waters. Toxicity is not an issue as only

Water Based Drilling Fluid will be used which is non-toxic. In Deep Water the drill cuttings will be discharged through a shunt pipe at optimum depth below sea-level so as to minimise visibility.

Visibility is main impact on Tourism for which avoidance of the Tourist season is the only mitigating measure available.

Testing is another highly visible activity especially at night when the flare can be seen from miles around. Mitigating measures are few and involve the use of high efficiency flares to avoid unburned fossil fuels to discharge into the sea, to maximise combustion of hydrocarbons and minimise the test period. OGP standards to be adhered to (OGP, Report Nr. 2.79/288, 2000). The impact of the flare at night on the attraction of fish has been described and its social impact on artisanal fishing has been recognised. Mitigation is considered in the form of financial compensation.

- *In general, the NCEA considers it important that the strict and thorough implementation of the Environmental Management Plan and mitigation measures not only takes place, but is seen to take place. It is thus recommended that: (a) regular stakeholder consultations and information sharing continues, (b) the Stakeholder Forum is actively engaged to help facilitate information sharing and dialogue, and (c) a transparent monitoring and reporting system is established, that includes representation from civil society (e.g. members of the Stakeholder Forum).*