APPENDICES

with the advisory review of the
environmental impact statements of
the hydrocarbon appraisal and
development in Camisea, Peru

(appendices 1 to 7)

APPENDIX 1

Letter from the Royal Netherlands Embassy, dated January 12 1998, in which the Commission has been asked to submit an advisory review

Ambassade van het Koninkrijk der Nederlanden

Embajada Real de los Países Bajos
Av. Principal 190 - 4to. piso, Urb. Sta. Catalina, La Victoria,
Lima 13, Peru
Tel. 51 -1 - 476 1069/476 1266/476 1193, Fax 51 - 1 - 475 6536
E-Mail : nlgovlim@hys.com.pe

Lima, January 12, 1998

Subject : Peru/Shell Camisea

Reference : GW/SHELL/0037/98

Dear Mr. Scholten,

With reference to earlier conversations and correspondence, and more specifically my fax, dated 17 november 1997, I herewith ask the Commission for EIA to advise on several EIA-studies prepared by Shell Prospecting & Development (Peru) B.V. for the Camisea project.

The competent Peruvian authority (Ministry of Energy and Mines) welcomes collaboration with the Commission in the review process. The ideal set-up for this collaboration would be a review of the two EIA's that have already been performed and approved (Camisea Appraisal Drilling Campaign (1996) and the Pagorent/San Martin East Exploratory Wells (1997) and a review of the scoping document from the three EIA's for the Full Field Development Programme :

1. in-field production wells and pipelines connected to a gas processing plant in the Camisea Region.
2. two parallel export pipelines for gas and gas liquids from the gas processing plant to the Pacific coast.
3. a coastal fractionation plant, storage and marine loading facilities for the natural gas liquids.

NETHERLANDS COMMISSION FOR EIA
Att. Mr. J.J. Scholten
P.O. Box 2345
3500 GH Utrecht
The Netherlands

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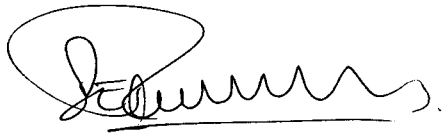
For the review a working group should be formed which ideally consists of five Netherlands experts and one Peruvian expert. The review should be carried out jointly with the competent Peruvian authority and should ideally result in one comprehensive advice. This joint review could be repeated when the Full Field Development programme is finalized.

Contact persons at the level of NEDA are Mrs. A. Wevers of the Environment Programme and Mr. G. Woudt of the Netherlands Embassy in Lima, Peru.

Your workprogramme with the Peruvian authorities as well as the members of the working group and the budget are awaited, with reference to the Agreement of March 1993 between the Commission and the NEDA.

Looking forward to your reaction, I am,

Yours Sincerely,



S.E. Ramondt
Ambassador.

cc.: Mrs. A. Wevers, Ministry of Foreign Affairs, Environment Programme (DML/MI)

APPENDIX 2

Project information

Proposed activity: In 1996, an agreement came into force between Shell and the Peruvian authorities for the purpose of hydrocarbon appraisal and development in the Lower Urubamba region. This area and more specifically the so called Camisea Blocks are located some 500 km east of Lima, in the department of Cuzco. Two EIAs for the appraisal drilling campaign were conducted and approved in 1996 and 1997. The results of the appraisal drillings will be used to aid the decision on whether to proceed with the Full Field Development Programme (FFDP). This decision has to be taken mid 1998. The FFDP consists of:

- in field production wells and pipelines connected to a natural gas processing plant in the Camisea Region;
- two parallel export pipelines for gas and natural gas liquids from the gas processing plant to the Pacific coast;
- a coastal fractionation plant, storage and marine loading facilities for the natural gas liquids.

Each of the components will be covered by a separate EIA.

Categories: oil/gas pipelines; DAC/CRS 71400, production and distribution of gas and electricity; DAC/CRS 41000-20

Project numbers: GW/SHELL/0037/98; Commission for EIA 031

Progress: Letter with request to submit an advisory review: 12 January 1998
Advisory review submitted: 29 May 1998

Composition of the working group of the Commission for EIA:
Mr W.G. Been
Mr A.J. van Bodegom
Mr J.W. Kroon (chairman)
Mr J.M. Marquenie
Mr L.A.F. Román Villanueva

Mr. F. Bernabal of the Peruvian Ministry of Energy and Mines participated as the Peruvian counterpart during the site visit of the working group to Lima and Camisea.

Technical secretary: Ms I.A. Steinhauer

APPENDIX 3

Working Programme Site Visit to Peru

Wednesday, March 4th	19.30	Arrival from Amsterdam
Tuesday, March 5th	09.00	Meeting at the Netherlands Embassy with Mr S.E. Ramondt, Ambassador
	10.30	Meeting with Mr P. Touzett, director of Hydrocarbons of the Ministry of Energy and Mines
	13.00	Meeting at Shell Prospecting and Development Peru, with Mr M. Jones, manager health, safety and environment
	14.00	Briefing by Ms. J. Iverach, preparation for the site visit to Camisea
	15.30	Continuation meeting with Mr M. Jones
	17.00	Meeting with Mr P. Solano (director of the conservation programme) and Ms. F. Noejovich (specialist on the Camisea project on indigenous communities) of the Peruvian Society on Environmental Law
	19.30	Cocktail at the residence of the Netherlands Ambassador
Friday, March 6th	06.00	Site visit to Camisea by plane and helicopter to the Nuevo
	18.00	Mundo base camp, the Pagoreni well site, San Martín well site and Cashiriari 3 well site.
Saturday, March 7th		Meetings of the working group and elaboration of draft report
Sunday, March 8th		Working group meetings and elaboration of draft report
Monday, March 9th	09.00	Meeting at Environmental Resource Management (ERM) with Mr J. Briceno (field survey coordinator) and Mr S. Kapilla (consultants coordinator)
	11.30	Meeting with Mr A. Reggiardo, president of the Congress Commission on the Environment of the Parliament
	13.30	Meeting with Mr. J. Santisteban of the Smithsonian institute
	17.00	Meeting at the National Institute of Natural Resources (INRENA) with Ms. E. Gómez (general director of environment), Mr L. Alfaro (general director of protected areas and fauna) and Mr A. Acuna (general director of planning).
Tuesday, March 10th	09.00	Workshop at the Ministry of Energy and Mines - Opening speech of Mr J. Mogrovejo, General Director of Environmental Affairs of the Ministry of Energy and Mines - Environmental Impact Assessment in the Netherlands and the role of the Commission for EIA in the Netherlands, Ms I.A.Steinhauer (technical secretary Commission for EIA) - Case study appraisal drilling for natural gas in the Netherlands Waddensea, Mr J.Marquenie (member Commission for EIA)

- Review findings of the EIAs prepared by Shell and relationship between the results of EIAs and licence conditions in the Netherlands, Mr W. Been (member Commission for EIA)
- Questions and discussion
- Closing remarks by Mr J.W. Kroon, deputy-chairman of the Commission for EIA

19.30 Cocktail at the residence of Mr Nijhof, head development cooperation of the Netherlands Embassy

Wednesday, March 11th 09.00 Workshop for NGOs and other stakeholders (see appendix 4 for list of participants)
programme: see above
Introduction by Mr S.E. Ramondt, Ambassador

14.00 Debriefing at the Netherlands Embassy

21.20 Departure to Amsterdam

APPENDIX 4

Overview of persons and organizations who provided input to the advice of the Commission

In the Netherlands (meeting in Utrecht on 17 February 1998):

Ms J. Groenendijk	Netherlands Committee of the International Union for the Conservation of Nature (World Conservation Union)
Ms T. Mohr	Both Ends
Ms I. Bloemink	Milieudefensie (member of Friends of the Earth)
Mr A. v.d. Hoek	ASEED

In Peru (workshop in Lima on 11 March1998):

Ms P. Albareda	Royal Dutch Embassy in Lima
Ms A. Alegre	Sociedad Peruana de Derecho Ambiental
Mr L. Alfaro Lozano	INRENA
Ms M. Benavides	OXFAM
Ms J. Brioso	APRODEH
Mr M. Calderón	Cámara Nacional Forestal
Ms A.M. Chonati	Conservation International Perú
Mr J. Chong	Ministerio de Energía y Minas
Mr G. Dávila	Mobil Exploration
Ms K. De Samaniego	Klohn Crippen SVS
Mr A. Guerrero de los Rios	Auditec S.A.
Mr R. Guerrero de los Rios	Auditec S.A.
Mr J. Ibañez	Consultant
Ms C. Indacochea	Ministerio de Energía y Minas
Mr E. Larrea	Consultant
Ms G. Lopez	Forestoil
Ms M. Manriquez	CONAP
Ms F. Noejovich	Sociedad Peruana de Derecho Ambiental
Mr S. Pacsi Valdivia	Universidad Nacional Agraria La Molina
Mr A. Paredes	Cámara Nacional Forestal
Mr A. Pasco Font	GRADE
Mr M. Portillo	Royal Dutch Embassy in Lima
Ms L. Rivera	CEDIA
Ms M. Rodriguez Varga	CAAAP
Ms E. Roof	Royal Dutch Embassy in Lima
Mr M. Ruiz Larrea	Shell
Ms S. Sánchez	APECO
Mr C. Sarasara	CONAP
Ms A. Smith	Worldlife Fund
Mr R. Smith	Consultant
Mr G. Suarez de Freitas	Pro Naturaleza
Mr B. Tobin	Asociación para la Defensa de los Derechos Naturales
Ms C. Uchima	INRENA
Mr J. Ugaz	Pro Naturaleza
Mr C. Yañez	Defensoría del Pueblo

APPENDIX 5

Guidelines (and review framework) for the EIA for the full field development of the Camisea production and reinjection facilities

1. POINTS OF SPECIFIC INTEREST AND ATTENTION

As a general learning point from the previous EIAs and as an add-on to the scoping report the Commission advises to

- bring the EIAs into procedure for stakeholder participation in a fixed timeframe during 1998 and 1999 (even if the planning is still of a tentative nature);
- if further EIAs can be expected, for instance due to expanding activities in Block 75, it is advised to include in each EIA the above mentioned "masterplan", in which also the maximum scenario is elaborated. In addition, such a masterplan should include the option for a potential future power plant;
- ascertain sufficient quantitative information on location and routes, (process) designs (gasprocessing, waterinjection, compression, flare systems), chemicals, products and their environmental characteristics;
- present the information as much as possible also in a graphical format;
- describe existing policies with respect to the area, population development and land-use and ownership;
- justify the selection of standards on basis of those applied elsewhere (California, Alaska, Canada) in sensitive areas;
- describe alternatives for the drilling process, including the use of alternative muds and for instance underbalanced drilling;
- give specific attention to treatment and control of sanitary waste and potential future handling of mercury and radioactive scale;
- include a quantitative risk analysis in interaction with inhabitants and environment, including blow-outs, leakages from processes, storage and pipelines with emphasis on the impact on surface waters;
- describe the present situation and the autonomous development as a reference;
- develop alternatives, give a full description of their impacts and the ways these impacts can be mitigated. Present the choices that were made in an understandable way, for instance by way of a matrix and indicate to which extent environment and the interest of (primary) stakeholders played a role in the decision making;
- develop a monitoring and evaluation plan with emphasis on measurable and controllable parameters, for instance by the selection of indicator species.

2. CONTEXT ANALYSIS AND PROJECT OBJECTIVES

The EIS must state in clear terms the problems which are expected to be solved following implementation of the project. At least the following aspects should be addressed:

- a description of the production scenario's;
- relation of this project with the pipeline project and the fractionation plant;
- the economic need to produce condensate;
- any markets which have been or will be established for Camisea gas and condensate;
- the value for economic development of Peru;
- the sensitivity of the environment;
- lessons learned of Shell activities in other countries and of similar activities in Peru.

The EIS must contain a clear definition of the objectives of the proposed activity to enable identification and formulation of alternatives and to furnish criteria for monitoring and evaluation. These objectives should logically ensue from the problem analysis.

3. PROJECT SETTING

Legal framework and formal decisions to be taken

The EIS must describe legislative and regulatory considerations and policies governing the proposed activity such as:

- Description of legal framework;
  - What decisions are to be taken and what were the previous decisions;
  - Description of the national parks, sanctuaries and other protected areas, including bufferzones, and of indigenous territories or communal reserves in a wide zone around the project area. Detailed description of their legal status;
  - Description of the existing (land use) planning and its legal status;
  - Description of policies regarding migration and colonisation;
  - Description of formal and informal landownership (what are the rights and expectations of local inhabitants and of nomad Indians);
  - Is there a compensation regulation for loss of natural values;
  - Is there a fund for compensation of calamities
- Description of the policy framework
  - What is the environmental policy (nature conservation, environmental protection, impact assessment) of Shell and of Shell Peru and what is the national policy;
  - What is the policy of Shell and of Shell Peru with respect of protection of indigenous people, rights on land etc. and what is the national policy.
- Standards and criteria
  - Legal standards governing environmental quality, health and safety;
  - Company standards and commitments: implementation of highest international standards and state of the art technology (are these realistic and achievable);
  - Comparison with international standards applied elsewhere in the world (California, Alaska, Canada).

These descriptions must lead to the formulation of limiting conditions (standards, requirements, criteria) for the initiative.

Institutional setting

The EIS must give a clear description of the institutional framework on the national and local level, including competent authorities directly involved in the execution of the project and the control and maintenance of the executed works.

Public involvement

The EIS must identify the stakeholders (affected groups and NGOs) in the project and how their opinions and interests did influence the contents of the EIS (e.g. project design and the development of alternatives as well as the proposed project execution). Both the public consultation process of Shell as well as of the Peruvian authorities has to be indicated. A document produced by the National Ombudsman may be of help[1]]

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1 Defensoria del Pueblo: Petroleras, estado y pueblos indigenas: el juego de las expectativas. Lineamientos preliminares para la consulta y participacion de los pueblos indigenas amazonicos del Peru en las actividades de exploracion y explotacion de hidrocarburos.

4. DESCRIPTION OF ACTIVITIES AND ALTERNATIVES

As the activity consists of (i) logistics (via water and air), (ii) a central gas processing plant, (iii)infield pipelines and (iv) production clusters, a detailed description is needed of the following elements:

Activities:

- gascondensate ratio, composition of gas and condensate, production water (salinity, metals, mercaptans, hydrogensulfide, BTEX). Chemicals: Use of chemicals and toxicity data (including pipelax, thread compounds, cementing, spacers and detergents, production and workover chemicals);
- location selection for the different clusters;
- location and process scheme for the gasprocessing plant including energy generation, gas-drying, waterinjection, compression;
- transport of people, materials, fuels, chemicals and equipment; type of transport (single or double walled barges, helicopter, hoovercraft, frequency of transport);
- erosion prevention under extremely humid conditions (not only run off erosion but also landslides): description of the angle of slopes, construction of terraces, species to be used for planting the terraces, measures to guarantee sufficient soil fertility;
- site construction (leveling, impermeable floors, water management);
- design of flare systems for well-testing, emergencies and gas processing plant. All flaring scenarios (well testing, compressure failure, disturbances in process plant) are to be described; flare prevention techniques; flaregas recovery techniques; optimal burner tip design and enclosed flare design. Save distances from other installations. Applied technical codes;
- design and operation of waste incinerator;
- a description of the drilling of production wells (slimhole drilling, alternative muds, under-balanced drilling techniques, selection and handling of mud, cuttings and chemicals, reuse of water);
- infield pipelines: design (routing, surface/subsurface, river crossings), construction operation;
- design of storage facilities (condensate, fuel, chemicals, mud, waste, cuttings);
- number of people and housing during construction and operating phase;
- description of maintenance and inspection systems;
- description of weed and insect control;
- description of environmental management plan, including emergency response planning;
- future expansions and modifications;
- abandonment.

Waste and waste water:

- amount and composition of waste and discharge water generated, location of discharge points;
- description of the waste management system and criteria used for site storage, incineration, injection, discharge of effluents, export out of Camisea.
- description of the waste treatment system (compactor, incinerator, flocculation, separation, biotreatment) and how is the proper function ensured;
- how are the following streams treated and registred: drilling waste, chemical waste (for instance paint tins, oil drums, mercury containing sludges, radioactive scale);
- household and sanitary waste;
- production water, contaminated rain water and waste water;
- how are rain and ground water handled (pH, salinity, DOC);

- how is the waste collected and stored or treated. What is done with oil contaminated cuttings, whether they are contaminated by using OBM, diesel or pipelax. What type of registration system is being used, how are checks and balances being made.

Noise:
- source levels (drilling, tripping, cementing, well testing, emergency shutdown, compression, generators, airfin coolers and flares, transport (hoovercraft, helicopters), in dB(A) and preferable also in dB(lin);
- frequency of peak levels;
- calculated immision contours in metres for 40, 50 and 60 dBA (also separate for peak levels with a freq. > 1/hr);
- noise reduction measures.

Light/heat:
- radiation levels; reduction measures

Emissions to air
- CO_2, SO_2, NO_x, VOC, smoke, methane, dust

Energy and resources:
- Energy consumption, especially fossil fuels (including infield gas)

Incidents/safety:
- quantative risk analysis in interaction with inhabitants (external safety report) and environment, including for blow-outs, leakages from process plant, storage facilities and pipelines; spills in surface waters;
- leak detection (gas, condensate, production water);
- safeguarding of product storage (overfilling, fire prevention);
- spillages on the river (collision of barges, unloading);
- emergency shutdown system (description of the systems including for infield pipelines);
- sabotage.

The EIS must elaborate the following alternatives and mitigation measures, including justification for choices made, taking into account environmental considerations:

- best environmental alternatives from the Fluor Daniel, Gran y Montero, Technic design options;
- seasonal alternatives in relation to erosion risk and biological factors as spawning of fish, insect activity, breeding of birds;
- spatial alternatives: location of gas processing plant, gas production clusters, water-injection wells;
- making the drilling sites suitable and accessible;
- supply and removal of material and personnel;
- drilling techniques, including underbalanced drilling;
- the execution of production tests;
- the abandonment of the drilling sites with subsequent rehabilitation.
- centralised power generation at gas processing plant;
- water/cutting injection;
- gas drying process (methanol, glycol, silicagel, molecular sieves);
- air fin cooling versus water cooling;
- confined oil/water separators (API/CPI type), biotreatment;
- low noise/ground flares;

- noise insulation running equipment;
- vapour return lines from storage to barge, during unloading;
- inner floator roofs in jetfuel storage tanks;
- double bottom and leak detection for storage tanks;
- 'zero-emission' option for gas processing and compression installation;
- application and waste handling of oil based mud and degradable synthetic muds (like ester-based muds) versus the use of water based muds.

5. CURRENT SITUATION AND AUTONOMOUS DEVELOPMENT

The description serves as a basis for comparison of the environmental and social effects of the various alternatives. It must be limited to those aspects that may be influenced by the activity or influence the activity and must cover the complete affected area. The EIS must indicate the maximum impacted area. As the Camisea project will have a life span of approximately 40 years, new developments/scenario's, although difficult to predict, must therefore be considered in the EIS.

The following aspects must be addressed regarding the natural environment:

- soil and ground water;
  - geomorphology;
  - soil type;
  - nutrient status;
  - sensitivity for disturbance;
  - ground water flow;
- surface water;
  - lakes and rivers;
  - run-off dynamics;
  - system oriented approach;
  - quality description;
- air;
  - general quality description;
- fauna (terrestrial and aquatic):
  - rare and endangered species and endemic species;
  - sensitive periods;
  - migratory species and migration patterns;
  - environmental quality restrictions (pH, Hardiness, Salinity, Eutrophication);
  - complete inventory of fish and benthic fauna (shellfish/snails) in streams that will be affected by wastewater from project sites and of streams in the neighbourhood (for comparison).
- flora;
  - vegetation mapping of the area (showing rareness of vegetation types, susceptibility to erosion and environmental changes);
  - rare and endangered species;
  - sensitive periods for recovery;
  - environmental quality restrictions (pH, Hardiness, Salinity, SO_2);
- ecosystem;
  - ecosystem key species;
  - ecosystem response;
  - resilience

The EIS must contain a description of the socio-economic environment:

- inhabitants of the area;
- tourism;
- description of migration and colonisation patterns in a wide area around the project sites
- socio-economic baseline study, including data on use of natural resources (timber and non-timber), crop production and trade;
- socio-cultural information, like cosmology, sacred places;
- gender issues;
- economic, social and cultural information on nomad Indians, including their zone of influence.

6. IDENTIFICATION AND EVALUATION OF IMPACTS

The EIS should describe interactions in a logical way between activities (regular and incidental) and the natural and socio-economic environment.

Of major concern for the natural environment are:

- impact on rivers and streams due to incidents and malfunction of treatment facilities (ecological functioning, drinking water and fish resources) including rainwater run-off treatment/control;
- impact on soil and ground water (spills, operational discharges, erosion);
- flaring and venting (malfunction, maintenance and well clean out);
- transport during construction and maintenance (f.i. helicopter, hoovercraft);
- emissions during gas-drying and gas reinjection;
- impact on fauna (disturbance by presence of people, light and noise, migration routes, well testing);

Impacts on the socio-economic environment must be described in terms of:

- impact on socio-economics (attracting people, work, cleared ground);
- change in the way of life, including productive systems and trade, on the long term.

7. COMPARISON OF ALTERNATIVES AND MITIGATION

The EIS should give a full description of the impact of the alternatives and the ways the impact can be mitigated. The mitigating measures may include e.g. prevention of nuisance, measures to diminish risks and measures to prevent disturbance or pollution of valuable ecosystems. Preferably the mitigating measures should form an integral part of the intended activity to warrant their implementation as much as possible.
As part of the mitigation measures the EIS should contain:

- Description of the social capital programme, which should have the format of a project with objectives and targets, strategies for the distribution of the benefits, time schedule and budget.
- Description of a programme to enhance local cultural values.
- Description of a programme to mitigate or to compensate for the possible loss of biodiversity (e.g. annual financial contribution to nature management in the area).
- Identification of possible institutions outside Shell that can execute the programmes, including governmental institutions.

The alternatives must be compared preferably in the form of tables and diagrams. The current environmental situation and the autonomous development have to be included in the comparison. The comparison must yield the preferred alternative for implementation.

8. GAPS IN KNOWLEDGE AND MISSING INFORMATION

In the EIS lacking information must be identified. The importance for the decisions/selection process should be evaluated. The EIS has to indicate in which way and through which means serious knowledge gaps can be filled in or alleviated.

9. MONITORING AND EVALUATION

It should be indicated in which way the work, waste handling and emissions will be registered and reported. It should also be indicated which criteria will be used and what consequences will be taken from exceeding them.
In the EIS an environmental monitoring plan must be presented. This plan must induce monitoring of:

- ambient air quality
- ground and groundwater contamination
- water quality (including biological indicators)
- key animal species
- generation of indicators for monitoring of socio-economic and cultural changes, including the use of natural resources (for example medicinal plants);
- migration processes, internal and external to the communities.

The evaluation should especially focus on the EIA predictions (independent third party surveying and reporting, for instance according to ISO 14001). OSINERG (Organismos de Inversion en Energia) on the Peruvian side can also act in monitoring and evaluation.

10. TECHNICAL DIRECTIONS TO COMPOSE THE EIS

The EIS should be short and to the point, contain maps of sufficient detail. The use of GIS is strongly advised. General accepted calculation methods should be applicated.

11. SUMMARY

The executive summary should contain the major subjects of the EIS and be written in such diction that it provides non-technicians with a clear insight in the issues treated.

APPENDIX 6

Documents subject to review by the Commission

First EIA:
- Camisea Appraisal Drilling Campaign *Environmental Impact Assessment* July 1996
- Camisea Appraisal Drilling Campaign *Environmental Management Plan* July 1996

Second EIA:
- Pagoreni/San Martin East Exploratory Wells *Environmental Impact Assessment -scoping report* April 1997
- Pagoreni/San Martin East Exploratory Wells *Environmental Impact Assessment* August 1997
- Pagoreni/San Martin East Exploratory Wells *Environmental Management Plan* August 1997

Third EIA:
- Full Field Development Programme EIA's - *Scoping report* June 1997

- Briefing papers No. 1 -10

APPENDIX 7

Generic guideline for an Environmental Impact Assessment for exploration drilling

1. Introduction

Give reference to the overall project
What is the competence of the persons that issue this guideline
What is the objective of this guideline

2. Problem definition

What is the rational behind the exploration drilling
What is the economic need to explore for oil, gas and condensate, what is the internal development of an infrastructure (gas or oil network) and what are the expectations for the near future
Is there an interaction with a sensitive environment

3. Legal framework and formal decisions to be taken

3.1. description of legal framework
What decisions are to be taken
What were the previous decisions
Is there an interaction with national parks or otherwise protected areas
What are the rights and expectations of local inhabitants
What are the rights and expectations of the nomad Indians
Describe the consultation process
Is there a compensation regulation for loss of natural values, if any
Is there a fund for compensation of calamities, if needed

3.2. description of the policy framework
What is the environmental policy (nature conservation, environmental protection, impact assessment) of the initiator of the project and what is the national policy.
What is the policy of proponent with respect of protection of indigenous people, rights on land etc. and what is the national policy

3.3 Standards and criteria
What legal standards do apply
What are the company standards and commitments;
What are the highest international standards and state of the art technology.
What standards will be followed and how do they compare with international standards applied elsewhere in the world in sensitive environments (California, Alaska, Canada) and justification of standards that are chosen for the projects.

4. Description of activities and alternatives

The activity consists of:
1. site selection
2. logistics (via road, water and air;
3. drilling activity
4. well-testing
5. abandonment

4.1. Activities.

A detailed description is needed of the following elements:

- location selection for one or more sites and a description of their use
- transport of people, materials, fuels, chemicals and equipment; type of transport (trucks, single or double walled barges, helicopter, hovercraft, frequency of transport, etc.)
- site construction (levelling, impermeable floors, water management, etc.)
- erosion prevention under extremely humid conditions (not only run-off erosion but also landslides). Description of the angle of slopes, construction of terraces, species to be used for planting the terraces, measures to guarantee sufficient soil fertility
- description of the drilling process and well trajectory. What is the geology (including expectations of shallow gas and salt gaps) preferred casing design and what drilling fluids are going to be used, what is the composition of these fluids and what are the environmental and toxicological characteristics. What is the expected duration of the drilling. What measures are taken against a blow-out
- design of flare systems for well testing, emergencies and gas processing plant. All flaring scenarios (well testing, compressure failure, disturbances in process plant) to be described; flare prevention techniques; flare gas recovery techniques; optimal burner tip design and enclosed flare design. Save distances from other installations. Applied technical codes
- design and operation of waste incinerator and waste compactor
- give a description of the drilling of production wells (slimhole drilling, alternative muds, under balanced drilling techniques, selection and handling of mud, cuttings and chemicals, reuse of water, etc.)
- design of storage facilities (condensate, fuel, chemicals, mud, waste, cuttings)
- number of people and housing during construction and operating phase
- description of maintenance and inspection systems and description of weed and insect control
- description of environmental management plan, including emergency response planning
- future expansions and modifications
- abandonment (including site and roads)

waste and waste water:

- Amount of waste and discharge water generated and composition, location of discharge points
- Description of the waste management system and criteria used for:
  - site storage;
  - incineration;
  - injection;
  - discharge of effluents.
- Description of the waste and waste water treatment systems (compactor, incinerator, flocculation, separation, biotreatment, etc.) and how is the proper function ensured
- How are the following streams treated and registered: drilling waste, chemical waste (for instance paint tins, oil drums, chemical bags)
- Household and sanitary waste
- Formation water (e.g. flowing well water during under balanced drilling, contaminated rain water and waste water
- How are rain and ground water handled (pH, salinity , DOC)
- How is the waste collected and stored or treated. What is done with oil contaminated cuttings (OBM, diesel or pipelax). What type of registration system is being used, how are check and balances being made.

Noise:
Source levels (drilling, tripping, cementing, well testing, emergency shutdown, compression, generators, airfin coolers and flares, transport (hovercraft, helicopters), etc. in dB(A) and preferable also in dB(lin)
Frequency of peak levels
Calculated immision contours in metres for 40, 50 and 60 dB(a) (also separate for peak levels with a freq. >1/hr)
Noise reduction measures

Light/heat:
Radiation levels; reduction measures

Emissions to air
CO_2
SO_2
NO_x
voc..
H_2S
smoke
methane
dust

Energy and resources:
Energy consumption, especially fossil fuels (including infield gas)

Incidents/safety:
- quantitative risk analysis in interaction with inhabitants (external safety report) and environment, including for blow-outs, leakages from process plant, storage facilities and pipelines; spills in surface waters
- leak detection (gas, condensate, production water)
- safeguarding of product storage (overfilling, fire prevention)
- spillages on the river (collision of barges, unloading, etc.)
- emergency shutdown system (description of the systems including for infield pipelines)
- sabotage

4.2. Alternatives/mitigation:
- Spatial alternatives: what are the alternative sites and how are they situated with respect to potential future production, logistics, erosion, runoff and calamities/spills.
- Seasonal alternatives in relation to erosion risk and biological factors as spawning of fish, insect activity, breeding in birds, etc.
- Technical alternatives like offshore policy versus road construction, maintenance and abandonment, water treatment with confined and skid-mounted oil/water separators (API/CPI type), biotreatment, application of slimhole drilling techniques, under balanced drilling, low noise/ground flares or enclosed flare systems, noise insulation running equipment, etc.
- Vapour and leakage control like return lines from storage to barge during unloading, inner floater roofs in jetfuel storage tanks, double bottom and leak detection for storage tanks
- Application and waste handling of oil based mud and degradable synthetic muds (like ester-based muds) versus the use of water based muds

5. Status of the environment and autonomous development

Delimitation:
- maximum impacted area

Soil and ground water:
- What is the geomorphology of the area, soil type and nutrient status
- What is the sensitivity for disturbance, erosion, loss of fertility
- What is the flow direction and use ground water

Surface waters:
- Give a description of the (interconnected) hydrological system (creeks, lakes and rivers) and describe the run-off dynamics.
- Describe the water and sediment quality in general terms with a detailed description at the points where discharges, spills, or uncontrolled run-off may enter the surface water (pH, oxygen, turbidity, hardness, salinity/conductivity, chloride).
- Provide information on hydrological dynamics, seasonal fluctuations.
- Give a general description of the expected autonomous development of the hydrological system.

Climate and air:
Give a general description of the local climate and an air quality description

Fauna (terrestrial and aquatic):
- Describe any rare and endangered species described to be living in the area.
- What are the environmentally sensitive periods (e.g. reproduction)
- Do migratory species make use of the area
- What environmental quality restrictions (pH, Hardiness, Salinity, Eutrophication) apply to the described species
- Give a detailed description of fish and aquatic macro benthos at the points planned or incidental discharges.

Flora:
Provide vegetational maps and describe any specific trees that may serve protection and rare and endangered species around the projected sites.
What are the sensitive seasonal periods and time (in years) for recovery
What are the expected environmental quality restrictions (pH, Hardiness, Salinity, SO_2)
What species may be useful for revegetation

Ecosystem:
- What are the ecosystem key species and what is the ecosystem response (aquatic and terrestrial)
- What is the expected resilience of the system against disturbance.
- What is the autonomous development of the area in a time scale that relates to a period of potential full field development

People:
- Give a general description of the inhabitants of the area. What is their history and present state of development.
- Describe their way of living with emphasis on essential natural resources.
- What are the weaknesses in health and social or cultural development.
- Describe migration or merchandise routes of indigenous people (including nomad Indians)
- What is the intensity of tourism in the region and how is it expected to develop in the near and middle term future.

6. Environmental impact

Section should describe interactions in a logical way between activities (regular and incidental) and the environment.

Of major concern are:

- Site selection is of major concern since if exploration is successful the site in general will not be abandoned but used for future production over the life expectancy of the field (20-40 years). Proper site selection is therefore crucial in this phase.
- Impact on rivers and streams (including associated biotics) due to operational discharges, incidents and malfunction of treatment facilities (ecological functioning, drinking water and fish resources) including rainwater run-off treatment/control.
- Impact on soil and ground water (spills, operational discharges, erosion)
- Flaring and venting (malfunction, maintenance and well clean out)
- Impact due to transport during construction and maintenance (e.g. helicopter, hovercraft), including transport accidents.
- Impact on fauna (disturbance by presence of people, light and noise, migration routes, well testing) and the resulting impact on the natural resources of indigenous people.
- Impact on socio-economics (attracting people, work, cleared ground)

7. Comparison of alternatives and mitigation

Section should give a full description of the impact of major alternatives and the ways the impact can be mitigated.

8. Gaps in knowledge and missing information

The importance for the decisions/selection process should be clearly indicated

9. Monitoring, evaluation and reporting

It should be indicated in which way the work, waste handling and emissions will be registered and reported. It should also be indicated which criteria will be used and what consequences will be taken from surpassing them.

The evaluation should especially focus on the EIA predictions (independent third party surveying and reporting, for instance according to ISO14001). The EIA should formulate a proposal for a monitoring plan in order to verify predictions and fill in important gaps in the knowledge. The program should at least pay attention to the following:

- Monitoring of water quality (discharges and ambient water quality)
- Monitoring of ground and ground water contamination
- Monitoring of structural biological elements with a functional significance (benthic fauna, fish, hunting prey like deer and ape).
- Monitoring of people (opinion, complaints, way of life)

10. Technical directions to compose the EIA.

- Short and to the point
- Maps of sufficient detail
- Use of GIS is strongly advised
- General accepted calculation methods

11. Composition of the summary

The executive summary should contain all relevant information at management level (20-30 pp).