

Shell Prospecting and Development Peru

Pagoreni/San Martin East  
Exploratory Well Environmental  
Impact Assessment - *Scoping Report*

April 1997

**Environmental Resources Management  
Peru SA**

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For and on behalf of	
Environmental Resources Management	
Approved by:	<u>Jorge Briceño</u>
Signed:	<u>Jorge Briceño</u>
Position:	<u>Resident Manager</u>
Date:	<u>15 April 1997</u>

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## EXECUTIVE SUMMARY

### THE EXPLORATORY DRILLING PROGRAMME

*This is a Scoping Report for the Pagoreni/ San Martin East Exploratory Well Environmental Impact Assessment (EWEIA). This Scoping Report provides information on Shell Prospecting and Development Peru's (SPDP) proposed exploratory drilling activities, highlights how the EIA will be conducted, provides an initial, EIA annotated list of contents and forms the starting point for consultation.*

*An exploratory well is designed to determine the presence and depth of hydrocarbons and to confirm information gathered during seismic and/or geological investigations. If substantial hydrocarbons are located the wellsite could become a production site, but if not, then the wellsite is abandoned and fully reclaimed.*

*On 18 March 1997 SPDP/Mobil and Petroperu signed an exploration agreement for Block 75 in the Camisea Region. Under this agreement SPDP has committed itself to drill one exploration well before March 1999. Block 75 is immediately adjacent to the two smaller blocks, 88A and 88B, to which the joint venture currently has development rights under an agreement signed on 17 May 1996. As part of that agreement two major gas/condensate accumulations (San Martin and Cashiriari fields) are being appraised at present, at up to four separate wellsite locations (see Figure 1).*

*It is considered prudent to carry out the EWEIA at this time. This will meet with the commitment to drill one exploration well and maximise the sequence of drilling operations to take advantage of the availability of drilling equipment and personnel already in the region. This will minimise cumulative environmental impacts and reduce costs associated with otherwise demobilising facilities and personnel. SPDP is therefore embarking on a programme of determining exploratory drilling locations in two different regions (Pagoreni and San Martin East) within Blocks 88B and 75 (see Figure 1). The sites studies will be narrowed down to favoured options.*

*The Pagoreni wellsites are located over a potential reservoir identified in seismic surveys done in the 1980s and recently re-evaluated and interpreted. No drilling has taken place within this reservoir so far. SPDP has chosen four sites as potential locations to gain more information about these reserves (PR-A, -B, -C and -D). San Martin East (SME-A) on the other hand has been chosen in order to determine the eastward extent of the San Martin reservoir in which appraisal drilling is currently being conducted.*

*The actual rig, wellsite footprint and equipment will be much the same as that used during the present appraisal drilling campaign. After site selection but prior to finalising the design of the preferred exploratory wellsites, a topographical survey will be carried out to determine terrain and physiographic information. Initially it is expected that approximately four hectares will be required during the construction phase, which will later be reduced to two hectares with excess areas being fully restored.*

Exploration drilling will be carried out from a drilling location with transport support from helicopters, river barges and hovercraft. SPDP's existing base at Nuevo Mundo will continue to be used as the main logistics headquarters. The rig platform will be designed to prevent erosion and siltation around the platform area. Trees and/or bamboo cut as part of the clearance of the well footprint will be used for stabilising slopes. Building materials required for the project will be brought in from outside the area. Gravel (100 - 150 m<sup>3</sup>) will be collected from a designated nearby gravel bank in the river; the preferred location will be identified as part of this EIA.

The ongoing appraisal drilling campaign (ADC) employs many environmental control measures which will also be used during the exploratory drilling campaign. These include a Waste Management Plan for solids (ie, inert, organic, combustible and hazardous wastes) and liquid waste; an Erosion Control and Revegetation Plan; a plan for the control and safe disposal of drill cuttings and muds; and plan for the safe disposal of well test products which will include the flaring of gases and liquids. These measures will either avoid or minimise many of the potential impacts that are likely to occur, and coupled with effective and regular monitoring will help ensure that a close check is maintained on construction, drilling and operational practices.

The ongoing ADC in conjunction with its environmental control programme has encompassed a wide range of social initiatives. These include conducting a region-wide health baseline study and a diagnostic socio-economic and socio-cultural survey about to begin in the Lower Urubamba region. Field work conducted as part of this EWEIA will therefore increase the knowledge base and understanding of the socio-economics, cultural and anthropological characteristics of the communities potentially affected by exploration drilling activities. Construction of the exploratory wellsites will commence as soon as approval from the Ministry is gained and an agreement is reached with the relevant communities.

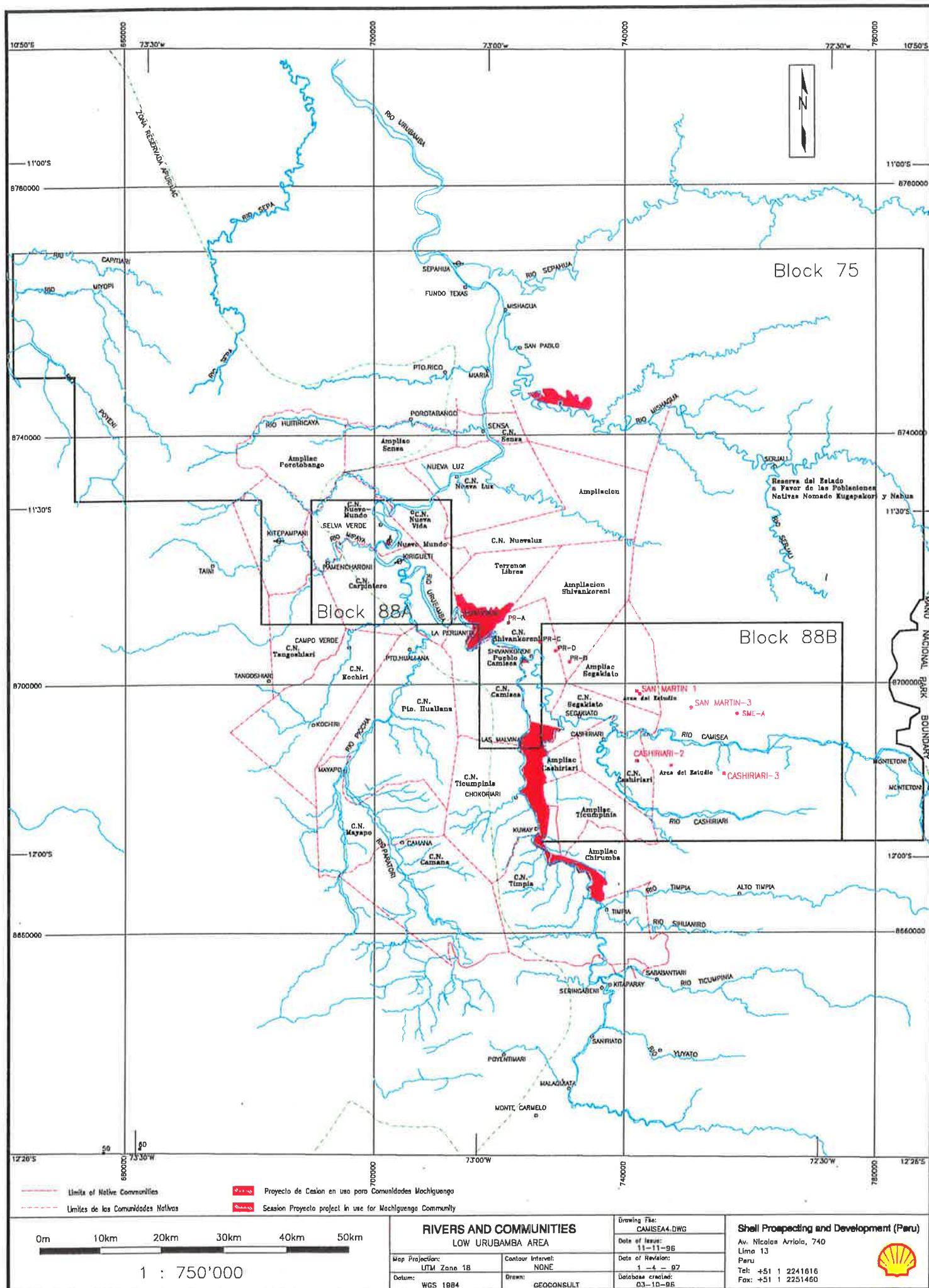
SPDP has publicly stated its commitment to making the Camisea project in total sustainable with net benefit to the region. It is based on sound operational practice, compliance with the highest standards, adherence to Peruvian and international legislation, and transparency, co-operation and consultation with a wide range of stakeholders.

## **EIA STRUCTURE AND APPROACH**

The EIA will provide the following information:

- statement of methodology;
- an account of the national and international legislation, standards and guidelines that are of relevance to this project;
- an account of the consultation process with primary and secondary stakeholders;
- a description of existing baseline environmental conditions;
- an assessment of the potential impacts and their required levels of mitigation;
- a summary of the residual impacts following implementation of stated mitigation measures.

The EIA has been divided into ten activities. What these are and their timing within the study are shown in the main report. The key activities are baseline data collection,



*field surveys, consultation with primary and secondary stakeholders and the implementation of several feedback loops to ensure that changing design and the consultation processes feed into the assessment of impacts. Field surveys will be carried out at a minimum to include soils, surface and ground water, flora, fauna, noise, ambient air quality, archaeological, cultural, socio-cultural and socio-economic resources.*

*The Environmental Management Plan (EMP) will provide details of the following:*

- mitigation measures to be undertaken for identified impacts;*
- an abandonment and monitoring plan following completion of exploratory drilling;*
- a preliminary emergency response and contingency plan;*
- a summary of the environmental training to be undertaken.*



## 1.1

*PURPOSE OF THIS DOCUMENT*

This document is designed to serve as a Scoping Document for the Pagoreni/ San Martin East Exploratory Well Environmental Impact Assessment (EWEIA). An exploratory well is designed to determine the presence and depth of hydrocarbons, to confirm information gathered during seismic and/or geological investigations. If substantial hydrocarbons are located the location could become a production site. If hydrocarbons are not found, the exploratory wellsites are abandoned and restored.

This Scoping Report is the starting point for the EIA and for consultation (see *Section 2.2.6*). The main objectives of this document are therefore:

- to provide information on Shell Prospecting and Development Peru's (SPDP) proposed activities including an outline project description, project schedule and some of the key environmental control measures that SPDP will employ during the exploratory drilling programme;
- to highlight how the EIA will be conducted, the proposed schedule and approach;
- to provide an initial EIA annotated list of contents.

Furthermore the consultation that will follow review of this document will allow:

- key concerns to be discussed regarding the overall project and how mitigating options or activities should be addressed both within the EIA and the EMP;
- supporting information to be provided that may be used during the EIA process.

Meeting these objectives will in turn strengthen and improve the quality of the EWEIA and the Environmental Management Plan (EMP) thereby making it a more effective working tool.

This document is supported by annotated contents lists for both the EIA (*Appendix A*) and the EMP (*Appendix B*).

## 1.2 BACKGROUND

### 1.2.1 General

On 18 March 1997 SPDP, Mobil and Perupetro signed an exploration agreement for Block 75 in the Camisea Region. Under this agreement SPDP on behalf of the SPDP/Mobil joint venture committed themselves to drill one exploration well before March 1999.

Block 75 encompasses the two smaller blocks, 88A and 88B, to which the joint venture currently has development rights under an agreement signed with Perupetro on 17 May 1996 (see *Figure 1*). Block 88B contains two major gas/condensate accumulations, the San Martin and Cashiriari reservoirs or fields, which are presently being appraised under this agreement. The EIA for this Appraisal Drilling campaign (ADC) which was approved in August 1996 is available as a public document at SPDP offices in Lima.

### 1.2.2 Searching for Project Alternatives

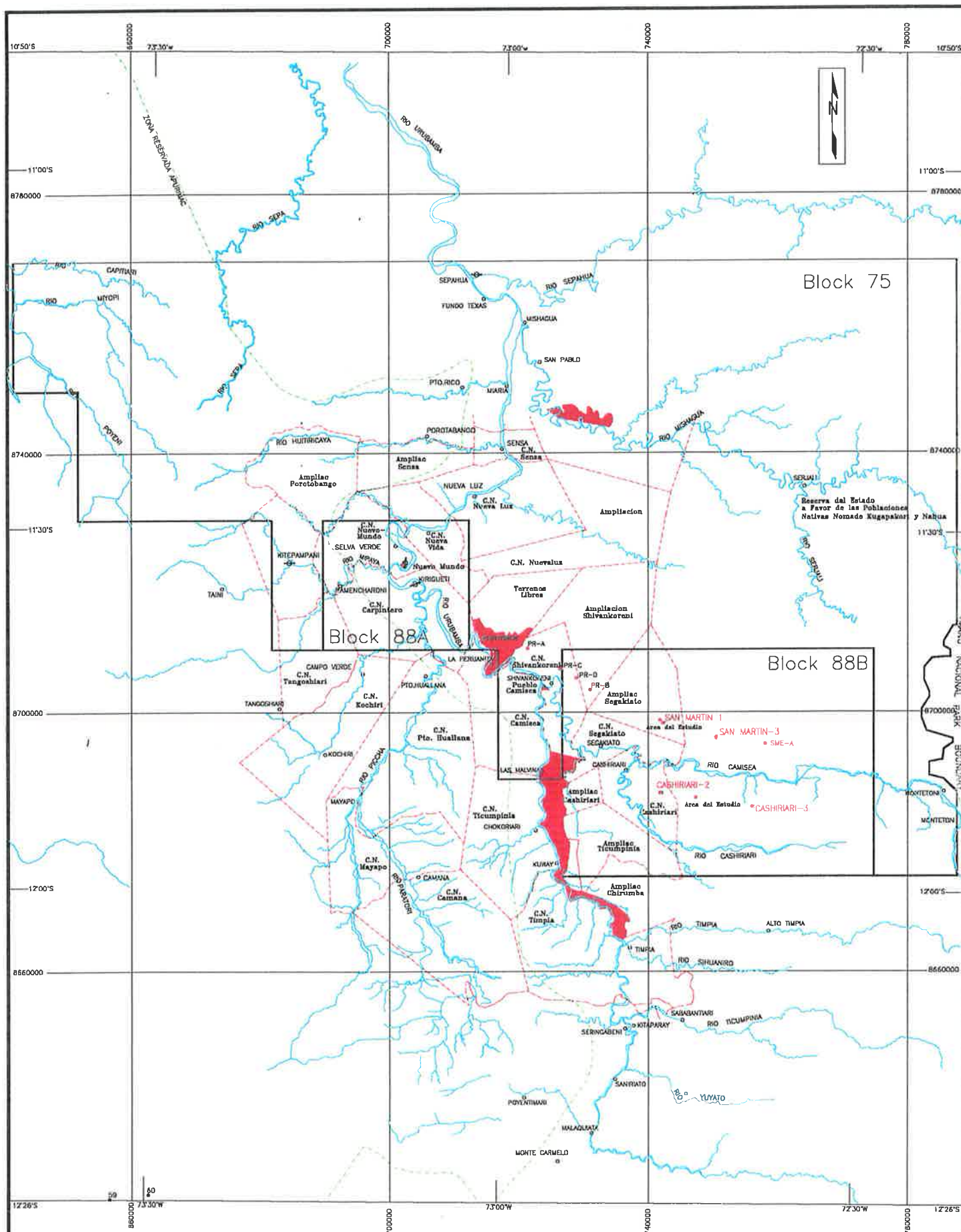
Between 1981 and 1987 Shell Exploradora y Productora del Peru had exploration rights for Block 38 and Block 42 of which the current Block 75 forms a part. Under the work programme carried out during that time, some 2,900 km of seismic was shot in Blocks 38 and 42. As a result, it is presently believed that there is sufficient seismic information in Block 75 to commit the exploration of one wellsite under the first phase of the exploration agreement. Some limited seismic will be required at a later date and will be the subject of a separate EIA.

As aforementioned, appraisal drilling is currently being conducted for the San Martin and Cashiriari fields (at three separate wellsites). In order to minimise the overall cumulative environmental impacts and utilise the existing drilling equipment (thereby cutting down further mobilisation costs and reducing impacts), it makes both economic and environmental sense if potential further contiguous sites within Block 88B were also investigated. At this present time therefore, it is considered prudent to conduct an EIA for a number of potential sites within Blocks 88B and 75, which could then be at a later date, narrowed down to the favoured drilling options.

This EIA will include the study of four potential sites at Pagoreni, PR-A, -B, -C, and -D (two of which are inside Block 88B) and one site at San Martin East, SME-A (within Block 88B) - see *Figure 1*. SPDP will on the basis of the survey results seek permission from DGH for an exploratory well at San Martin East and at one (or more) from a list of 4 potential sites at Pagoreni.

### 1.2.3 Why Pagoreni and San Martin East

The Pagoreni wellsites are located on a structure which was defined by seismic acquired in the 1980s. No drilling has taken place within this reservoir so far. SPDP now wishes to gain more information about this structure and has chosen four sites (which are geographically spread out) to



--- Limits of Native Communities  
 --- Limits de las Comunidades Nativas  
 --- Proyecto de Cesión en uso para Comunidades Machigueno  
 --- Sesión Proyecto project in use for Machigueno Community

0m 10km 20km 30km 40km 50km

1 : 750'000

# RIVERS AND COMMUNITIES LOW URUBAMBA AREA

Map Projection: UTM Zone 18  
 Datum: WGS 1984  
 Contour Interval: NONE  
 Drawn: GEOCONSULT

Drawing File: CAMISEA4.DWG  
 Date of Issue: 11-11-96  
 Date of Revision: 1-4-97  
 Database created: 03-10-96

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support its investigations. San Martin East has been chosen because SPDP wishes to determine the eastward extent of the reservoir in which appraisal drilling is currently being conducted. This area is believed to be geologically complex and exploratory drilling will provide valuable information to determine the amount of hydrocarbons in this region of the reservoir and how feasible it will be to extract it. One exploratory site is deemed appropriate for this activity.

#### 1.2.4 *Project Schedule*

Following project mobilisation and initial consultation, an EIA Field Survey will be conducted to supplement secondary information and baseline data and collect relevant samples. Following identification of the most favoured drilling options which will begin during the EWEIA, a topographic survey (supported by helicopters) will be conducted (with prior agreement from the relevant communities) in order to obtain information at an early stage which can aid the engineers in designing the sites. A topographical survey requires access to the site (via helicopters) and hand-cutting of gridlines in order to determine information regarding terrain and physiography. Construction of the wellsites will begin as soon as approval is given to the EIA by the DGH and agreement is received from the relevant communities. There is a considerable amount of synergy with the existing ADC, in terms of mobilising equipment to the wellsites (ie all the drilling equipment and personnel will already be in the region). *Figure 2* provides a proposed project schedule.

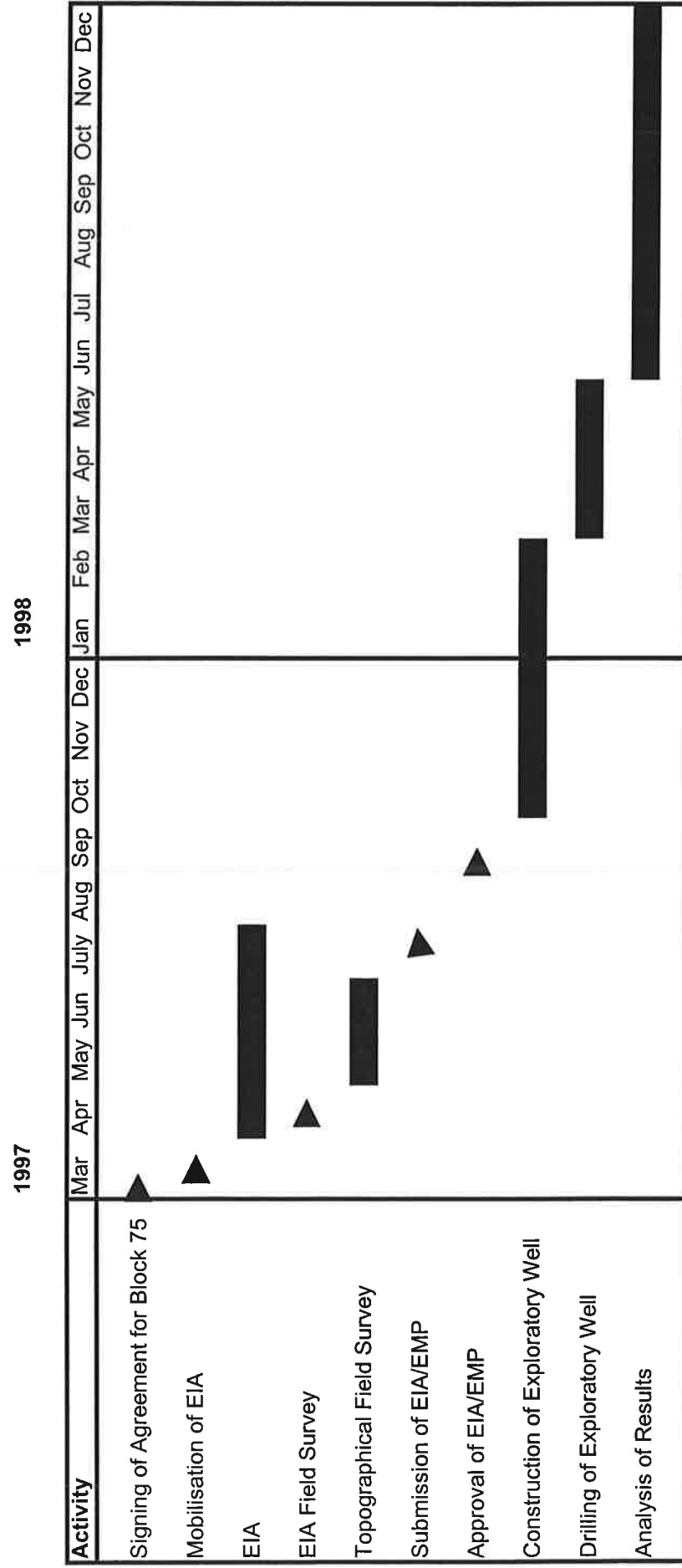
### 1.3 *EIA AS A PART OF OVERALL ENVIRONMENTAL MANAGEMENT*

In accordance with Peruvian legislation (and Shell's internal HSE Management System - HSE MS) developers are obliged to subject all their proposed activities to prior EIA, so as to ensure that adequate provision has been made for environmental protection which can be incorporated into the design and execution of the project. SPDP has publicly stated its commitment to making this project *sustainable* with *net benefit* to the region, and one which is based on *sound operational practice*, *compliance* with the highest industrial standards, *adherence* to Peruvian and international legislation, and *transparency, co-operation* and *consultation* with a wide range of stakeholders.

### 1.4 *LEARNING LESSONS*

The EWEIA will be the second major EIA commissioned by SPDP. This follows the completion of the ADC EIA and approval in August 1996. Lessons have already been learnt from both the EIA and the on-going field activities, for example, it did not allow for such matters as substantial increases in the requirement for raw materials. The EW EIA will use an environmental risk assessment approach to identify areas of uncertainty or deviation from a planned course of action and develop contingencies to address potential problems that might arise. By learning from lessons, SPDP

Figure 2: Project Schedule



hopes to contribute to raising its standards of EIA, as well as providing a more comprehensive EIA and implementable EMP.

## 1.5 *LOGISTICAL SUPPORT*

Exploratory drilling in either Block 75 or 88B will be carried out from a remote drilling location with transport support from helicopters, river barges and hovercraft (the mode of transport will depend on the accessibility of the site). SPDP's existing base at Nuevo Mundo will continue to be used as the main logistics headquarters. Fuels, chemicals and all other drilling equipment will be forwarded from Nuevo Mundo to the wellsite by helicopters. There may be a need to build an intermediate facility in order to shorten flying distances (thereby minimising risk and reducing environmental impacts) and to support heli-transport refuelling requirements. Ideally this will be on land already cleared by settlers.

## 1.6 *PROJECT OUTLINE*

The actual rig, wellsite footprint and equipment will be much the same as that used during the present ADC. Prior to finalising the location design of the exploratory well site, a topographical survey will be carried out to determine what is needed regarding removal of earth, potential landtake, amount of cut and fill needed etc. It is expected initially that approximately 4 ha will be required for construction of the drilling platform, fuels, chemicals and equipment storage areas, workers camp, helicopter landing/lay down area, and spill area for excess earth cut. This will later be reduced to 2 ha with excess areas (eg initial workers camp, heli-pad etc) being fully reclaimed (eg slope stabilisation and re-vegetation). The area cut for helicopter access (ie approach path close to the well site) and the communication support system will be hand cut leaving behind tree stumps.

The rig platform will be designed and equipped with a comprehensive drainage system, skimmer facilities and run-off controls (eg hydraulic controls, siltation ponds, and re-vegetation), all of which will prevent siltation around the platform area. Trees and bamboo cut as part of the landtake of the well footprint will be used for stabilising slopes (eg terracing and/or matting, construction of storage areas. Building materials required during the project will be brought in from outside the area, except for gravel (100 - 150 m<sup>3</sup>) which will be collected from a designated nearby gravel bank in the river. An assessment will be made as part of this EIA based on such criteria as proximity to location and quantity of gravel available without disturbing the river equilibrium, before any excavations are made.

## 1.7 KEY ENVIRONMENTAL CONTROL MEASURES

### 1.7.1 General

During the ongoing ADC the following key environmental control measures have been put in place to ensure that a policy of sound environmental management is adhered to. These environmental control measures will be used during the exploratory well drilling campaign.

### 1.7.2 Waste Management

A SPDP waste management plan currently exist for construction and drilling activities and may be reviewed upon request. A similar plan is being prepared at present for logistics. In addition, there are guidelines on waste management outlined in *Supreme Decree 046-93-EM* which SPDP shall abide with. SPDP plans indicate:

#### *Solid Waste Management*

- *Inert wastes:* A sanitary landfill for inert materials (which is lined and covered) has been constructed at Nuevo Mundo. A compactor has also been installed to reduce the volume of some inert wastes (eg plastics, glass and cans) prior to being disposed of in the landfill. Future needs will be assessed for a second such landfill.
- *Organic wastes:* A composting system for biodegradable wastes (eg foodstuffs) has been constructed and is operational at Nuevo Mundo. Future needs will be need to assessed.
- *Incinerable wastes:* An incinerator is currently operational in Nuevo Mundo and Cashiriari-2 which is being used to incinerate paper and cardboard.
- *Hazardous wastes:* Hazardous wastes (as defined in SPDP's waste management plan include such items as waste oils, medical wastes, batteries etc) are stored and labelled in specific areas which are lined, bunded and covered. All these wastes are then shipped out from Nuevo Mundo. Their final destinations (ie cradle to grave) are being currently identified in a study commissioned by SPDP to investigate the key options for handling hazardous waste types.

#### *Liquid Waste Management*

A fully closed primary and secondary sewage treatment system is currently being used at Nuevo Mundo and Cashiriari-2. Sewage is fed into the biological treatment unit where the solid residue (ie sludge) and waste waters are separated. The sludge is currently landfilled in Nuevo Mundo, but plans to use this sludge as fertiliser/compost are being investigated. All waste waters (meeting WHO discharge criteria) are recycled to the drilling waste water unit (where they are mixed with drilling make-up water). Eventually the drilling waters will not be suitable for drilling purposes, and at this stage

the waste waters will be fully treated before being discharged to specified standards into the surrounding stream. The possibility of reinjection is being investigated.

### 1.7.3 *Site Clearance and Management*

During exploratory drilling SPDP will employ a number of measures that will ensure that site clearance is kept to a minimum and site management is maintained to the highest standards. The key measures are as follows.

- *Clearance of well footprint:* During wellsite clearance there will be a need to clear an area larger than the design maximum of 2 ha. The overall area required will be approximately 4 ha and will include space for a temporary camp, laying down equipment, a temporary heli-pad, as well as construction room around the final design location, and eventually to include such features as siltation ponds. The additional excess areas will then be fully restored. During the initial stages the temporary camp will require its own water supply and waste management system. Water will be extracted from the nearest most suitable water source to be identified during the EIA.
- *Erosion control:* The cutting of steep slopes will be minimised during site preparation. Steep slopes will be shaped and erosion control techniques shall be employed (see next section).
- *Demarcation of site boundary:* The clearance boundaries of the total site will be clearly marked. Removal of vegetation or soil outside this boundary will be prohibited.
- *Preservation of topsoil:* During site clearance topsoil removed will be preserved and used during the revegetation programme. Care will be taken to ensure that in areas required for temporary clearance root structures are left in place.
- *Improved drainage systems:* An adequately sized drainage system will be constructed. This will ensure that the storm water will be carried from the drainage channels, that silt does not build up within the channels (avoiding overflow and build-up of stagnant waters), and allows for the separation of oils from the storm water. Siltation ponds will also be constructed at suitably identified locations to avoid silt from entering the forest boundaries.

### 1.7.4 *Erosion Control and Revegetation Plan*

Due to the heavy rainfall at the appraisal drilling sites, there have been some problems with gully erosion from the steep slopes surrounding the site and building up of silt in the drainage system and forest boundaries. SPDP has commissioned a revegetation plan which incorporates a number of erosion control measures, such as use of terracing, geo-nets and wooden lattices to stabilise the steep slopes, and the construction of a more effective wellsite



drainage system and silt traps, to filter the silt before rain waters are discharged to the forest floor. The revegetation plan itself includes such measures as site-specific species selection, seed, small trees and plant collection, spreading of topsoil collected from cut areas, and planting in key areas.

In future, these measures will become part of the site design and will be implemented during site construction. They will therefore be part of the exploratory well drilling programme.

#### **1.7.5      *Drilling Control***

- *Cuttings*: produced during the drilling operation will be collected, solidified and buried as inert material in a lined pit.
- *Muds*: waters from the muds will be recycled (explained under the liquid waste management section above), whereas the actual muds will be re-used and recycled until they no longer meet specifications and will be treated in the same way as the cuttings.

#### **1.7.6      *Well Testing Control***

During periods of well testing, gas and liquids will be flared. The flare will be fully contained with a cooling system, designed to avoid glare and reduce noise.

#### **1.7.7      *Summary***

The implementation of these environmental control measures will either avoid or minimise many of the potential impacts that are likely to occur during such a project activity, and coupled with effective and regular monitoring will help ensure that a close check is maintained on construction, drilling and operational practices. In accordance with Peruvian legislation, SPDP is subjected to an independent Safety and Environment audit of its operations.

## 2.1

**INTRODUCTION**

The EWEIA will contain at least the following:

- a statement of methodology for conducting the EIA;
- legislation and standards;
- a description of the intended activity;
- an account of the stakeholder consultation process;
- a description of existing environmental conditions;
- an assessment of impacts and mitigation;
- key residual impacts and conclusions.

The EMP will contain at least the following:

- an environmental mitigation and monitoring plan;
- an outline emergency response and contingency plan;
- activities for environmental training.

The remainder of this section provides some insight into how the overall EIA programme will be executed.

## 2.2

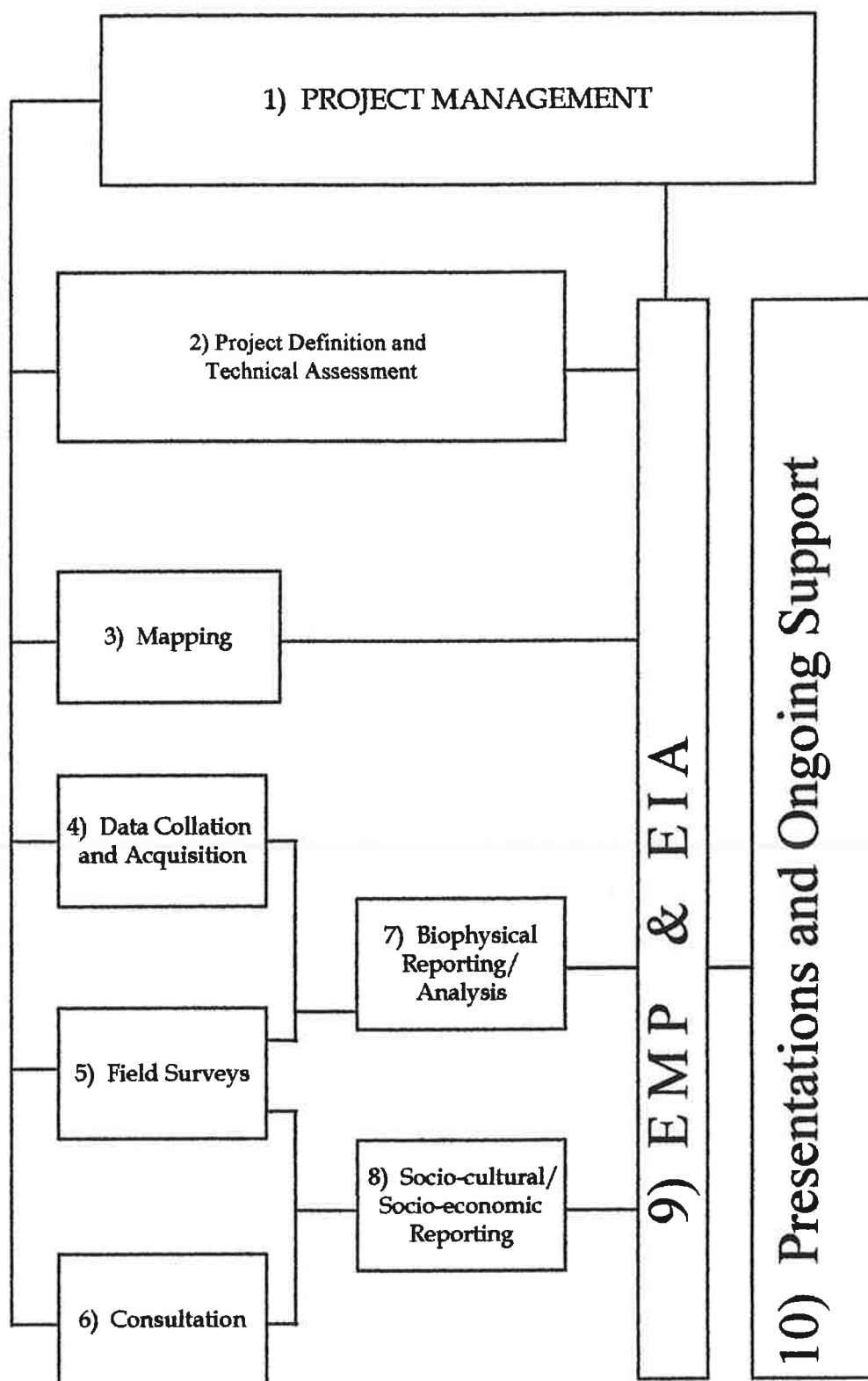
**ACTIVITY SCHEDULE**

The EWEIA has been divided into 10 Activities. *Figure 3* shows how the activities are inter-related. The schedule that will be followed in carrying out these activities is shown in *Figure 4*. The schedule is driven by four key factors:

- a need to develop and provide information in accordance with a consultation process particularly effecting local communities;
- a need to start drilling as soon as possible in order to maximise efforts for maintaining the drilling equipment in the region;
- approval from DGH is required by 30 September 1997;
- a submission date for the EIA and EMP by the end of July 1997 followed by a regulatory minimum 45 day approval period.

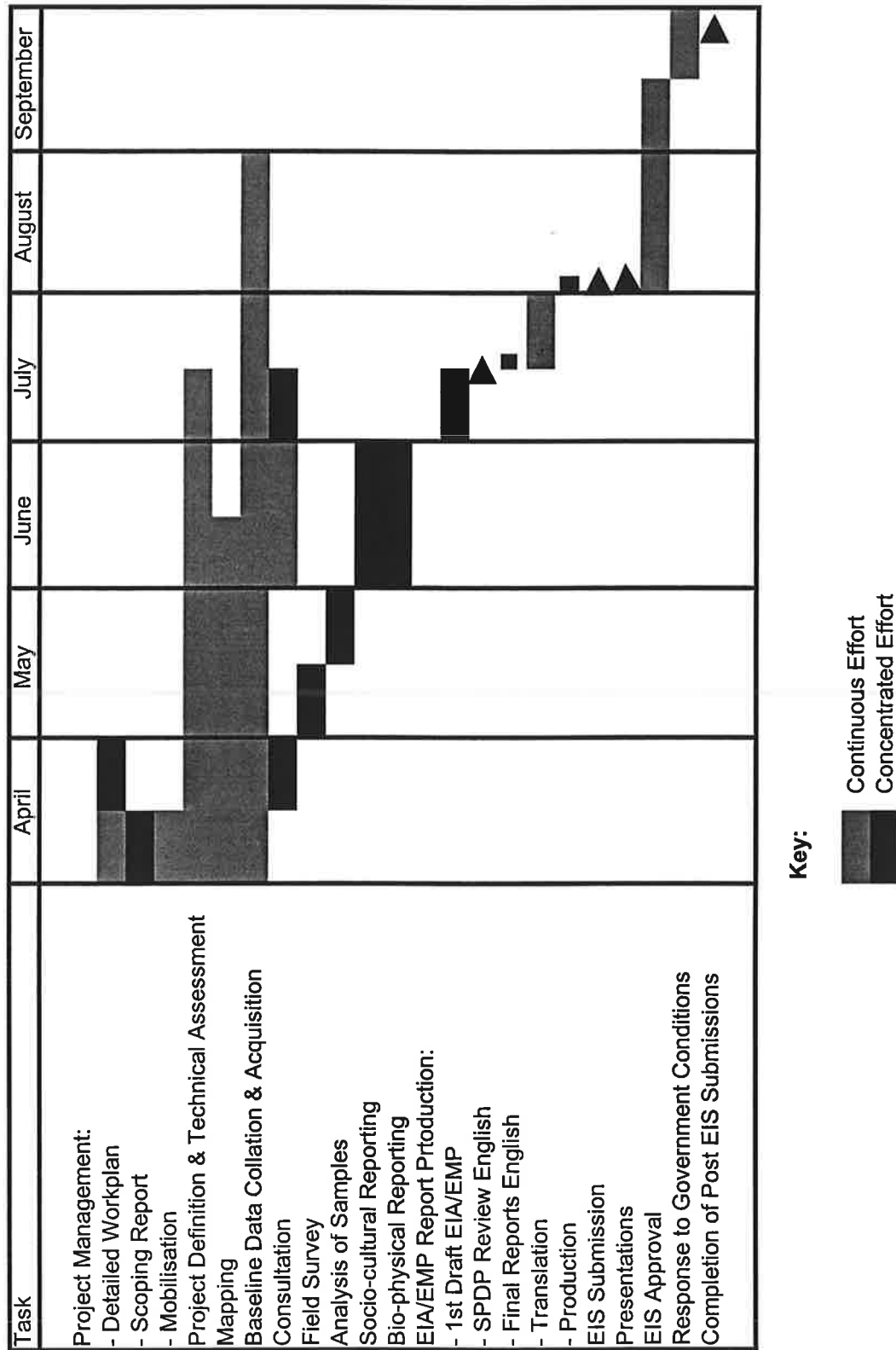
The individual EIA activities and personnel involvement are briefly described below.

**Figure 3 Main EIA Tasks**



Note: *only key linkages are shown*

**Figure 4: EIA Activity Schedule**



### 2.2.1 *Activity 1: Project Management*

Project management activities will run throughout the project period involving staff in both the Peru and UK ERM offices. Tasks will include preparing detailed work plans, liaison with SPDP and its drilling engineers, working with local consultants and sub-contractors, providing information and reports and communicating with interested parties.

### 2.2.2 *Activity 2: Project Definition and Technical Assessment*

SPDP will provide iterative feedback to ERM during development of the project description to ensure that the engineering design fully takes environmental issues into account.

### 2.2.3 *Activity 3: Mapping*

High quality mapping will form a fundamental basis of the EIA, used to present baseline information (eg landuse, forest and soil cover, location of wellsites and communities in relation to natural resources, water sampling locations etc). Maps will be produced using satellite imagery, aerial photography (taken during the helicopter 'fly-over'), ground-truthing surveys (during the field survey) and other baseline studies (ie site specific studies).

### 2.2.4 *Activity 4: Baseline Data Collation and Acquisition*

Baseline data collection will begin by drawing together existing baseline data. Following this initial task, outstanding data gaps will be identified and further data will be collected from existing sources and by visiting appropriate institutions. Any remaining information gaps will form the basis for determining the scope of required field surveys.

Full use of existing studies will be made including the ongoing flora and fauna field survey of the Camisea area being undertaken by the Smithsonian Institution; the health baseline survey already completed, and information from on-going consultation by SPDP Community Liaison Officers (CLOs).

The main topics which will be covered will include (but will not be limited to) the following:

- legislation;
- land use;
- soils and terrain;
- geology and hydrology;
- surface and groundwater environment;
- flora and fauna;
- climatic data;
- archaeology;
- health;
- socio-cultural environment

- socio-economic characteristics.

This activity will be carried out primarily by Peruvian specialists and research institutions and will be co-ordinated, advised and supervised by the ERM-Peru director and co-ordinator who will also collect and acquire data through data searches, government and institutional contacts.

### 2.2.5 *Activity 5: Field Surveys*

Field surveys will be completed to supplement baseline and ground-truth data (see *Section 3* for a brief on field-survey methodologies). At this stage it is envisaged that detailed field surveys will be required at a minimum in the following areas:

- soils;
- surface and groundwater environment;
- flora and fauna;
- noise;
- meteorological data and air quality data;
- archaeology;
- socio-cultural environment and socio-economics.

This activity will be an extension of the baseline data collection and will be lead by the same core team as indicated above. They will involve other Peruvian specialists identified as necessary by the gap analysis.

### 2.2.6 *Activity 6: Consultation*

SPDP is committed to a full and extensive programme of consultation and participation with key stakeholders (primary and secondary). The objective of the programme is to maintain a dialogue with stakeholders that provides for meaningful exchange of views and advice in relevant decision-making processes and to assist in the implementation of the project in an environmentally sensitive and socially responsible manner.

The consultation process is already underway but for the EWEIA the consultation programme begins with this Scoping Report and will be continued throughout the course of the EIA and design process. It is seen as a two-way flow in information and ideas as well as active collaboration in resolving issues, developing plans, implementing solutions and monitoring activities.

#### *Primary Stakeholder Consultation*

In order for the EIA to proceed in the area of the four possible Pagoreni wellsites, permission to enter the titled land of the native communities will be sought prior to any field work. SPDP through its CLOs will undertake the process of consultation to solicit permission to conduct the EIA, the topographical survey and the exploratory drilling itself. The key primary stakeholders to be consulted will be those potentially affected communities

(eg Shivangoreni and neighbouring communities in the case of the Pagoreni wellsites), and their affiliated organisations, COMARU and CECONAMA.

#### *Secondary Stakeholder Consultation*

Key secondary stakeholders that will be consulted during the EWEIA include:

- international organisations who will be informed of SPDP's proposed activities as part of SPDP's overall commitment to wide-ranging consultation;
- Government departments and ministries;
- national non-governmental organisations.

#### **2.2.7**      *Activity 7: Biophysical Reporting and Analysis*

This activity will act as a link between the baseline data collection / field surveys and the writing of the EIA. Tasks will include:

- mapping of survey results;
- analysis of samples and interpretation of results;
- analysis and evaluation of findings;
- initial assessment of impacts and mitigation.

This will be undertaken by the Peruvian environmental specialists with advice and guidance from ERM consultants in Peru and where necessary London, together with technical and 'coaching' input from international experts.

#### **2.2.8**      *Activity 8: Socio-Cultural Reporting*

This activity will act as a link between the field work and consultations and preparation of the EIA ensuring that:

- the knowledge gained through the socio-economic field work (*Activity 5* - field surveys; and *Activity 6* - consultation) is effectively implemented in the preparation of the EIA and EMP;
- the findings of and feedback from the EIA and EMP are fully reflected.

This will be undertaken by Peruvian social-anthropological specialists with advice and guidance from ERM consultants in Peru and where necessary London.

#### **2.2.9**      *Activity 9: EIA and EMP Report Writing/ Editing/ Translation*

This activity will involve taking the outputs from the other activities and processing the information into a Draft EIA and EMP. This activity will be based in the ERM-London office.

#### 2.2.10

#### *Activity 10: Presentations and Ongoing Support*

ERM will attend presentations and other meetings with SPDP and provide follow-up support between EIA/EMP submission and approval. This activity will be carried out by the Project Management team in Lima with back-up from local consultants and ERM UK when needed.





### 3.1 INTRODUCTION

As mentioned in Section 2.2.5 field surveys will be completed to supplement baseline and ground-truth data. The following sub-sections provide a brief description of the field-survey methodologies that are likely to be employed by the team of technical specialists.

### 3.2 FIELD SURVEY METHODOLOGIES

#### 3.2.1 Soils

At selected locations soil samples will be collected with an auger sampler device. These samples will then be analysed in Lima for agronomic and nutrient soil characteristics. Field description of soil horizons including coloration and texture will complement the information of different soil types in the area.

#### 3.2.2 Surface and Ground Water

Surface water samples will be collected using standard techniques (APHA, 1992) and analysed for parameters including temperature, pH, dissolved oxygen, inorganic salt levels, trace metals and total petroleum hydrocarbons. Surface (and sub-surface) water samples will be retrieved with a clean sampler (eg a 4" pvc tube or a plastic bucket) and placed in a glass or plastic bottle with adequate preservatives for metal and hydrocarbon analyses. Location of the watertable will be estimated through a soil auger.

SPDP's water well equipment will be used to monitor groundwater quality in the Camisea region. The information may not be site specific but the regional information will provide a good indicator of groundwater quality. Groundwater samples will be analysed for the same parameters as surface water samples.

#### 3.2.3 Flora

An assessment of plant community in the project area will be carried out using 2x100 m transects or 20x20 m plots depending on terrain relief. A tree survey will be carried out by recording trees in a plot with a diameter breast height (dbh) > 25 cm in order to identify the lowest taxonomic unit. A species inventory will be determined to evaluate total biomass and timber species in the area. Ground-truthing of the different plant communities will be undertaken in order to produce a general vegetation map for impact analysis.

### 3.2.4 *Fauna*

A qualitative assessment of certain indicator species (to be determined through discussion with Smithsonian Institution) will be carried at each wellsite (ie those that may best provide an indication of faunal diversity within the time available for field survey). Smithsonian Institution specialists will be involved during the field work.

### 3.2.5 *Noise Data*

A comprehensive baseline study of ambient noise levels will be conducted at the following locations:

- existing ADC wellsites (eg Cashiriari-2);
- Nuevo Mundo (airfield and community);
- potential exploratory wellsites;
- any dwellings or settlements close to the sites (eg Shivangoreni community).

Furthermore, operational measurements shall be taken for helicopters, boats, appraisal drilling rigs, wildlife in the jungle (day and night), and attenuation tests (ie to see how much noise is absorbed/dispersed by the trees and undergrowth). The measurements will be conducted using a sound level meter capable of measuring  $L_{Aeq}$ ,  $L_{A90}$ ,  $L_{A50}$ ,  $L_{A10}$ , and  $L_{Amax}$  over various time periods.

### 3.2.6 *Meteorological Data*

The closest meteorological station to the potential exploratory wellsites has been identified at Quillabamba. The meteorological data will be assessed and if suitable collected and used during the EIA. Parameters such as wind speed and direction, rainfall, humidity and temperature are needed for the EIA.

### 3.2.7 *Air Quality Data*

In the near future a programme of monitoring ambient air quality will commence. Diffusion tubes will be set up at such places as Nuevo Mundo (airstrip and community), Camisea and one of the existing ADC wellsites (eg Cashiriari-2). Analysis of these diffusion tubes will be carried out for  $NO_2$ ,  $SO_2$ , and possibly organic hydrocarbons.

### 3.2.8 *Archaeology/Cultural Resources*

An assessment of cultural resources will be conducted through topographic evaluation of potential historic settlements, features such as cave, terraces, hill tops, and natural river ports may be of special interest. The field team will include an archaeologist with knowledge of working in the forest environment. She will evaluate potential wellsites for artefacts, and will also conduct interviews with locals regarding any archaeological sites, local burial grounds or other points of interest.

During the socio-cultural assessment a number of different techniques will be used to collect data:

- *Secondary Information* - numerous reports and theses have been written on the Machiguenga people of the Camisea region. This will be identified and collected as part of Activity 4 - baseline data collation and acquisition.
- *Social Impact Assessment Guidelines* - Shell International Exploration and Production B.V. in conjunction with the Institute of Environmental Assessment (UK) has produced Social Impact Assessment Guidelines (EPO 95-0371). This document shall be used during the field survey assessment.
- *Participatory Rural Appraisal (PRA)* - the use of PRA techniques in rural situations is well documented. The use of such techniques as semi-structured interviewing or participatory mapping are all used to solicit information quickly from a selected group (eg women or elderly men).
  - semi-structured interviews - during the field surveys the socio-cultural expert will conduct a number of semi-structured interviews to elicit general demographic data or conduct a livelihood analysis for a selected community, and also to discuss more specific project related issues, in order to identify key concerns and potential impacts.
  - participatory mapping - used when trying to get a selected group to represent information visually (eg information on the group's daily activities) by creating a day profile or activities map.

These techniques will be used at the Shivangoreni and neighbouring communities.

## Appendix A

# Annotated Contents List for the Pagoreni/San Martin East Exploratory Well EIA

## *A1 INTRODUCTION*

### *A1.1 THE PROPOSED DEVELOPMENT*

- Licence Agreement for the Appraisal of Camisea Gas Reserves
- A brief description of the history of the project
- Commitment regarding Block 75
- Searching for Project alternatives
- Location of the exploration wellsites and Gas Fields - optional locations, what is driving the options and how they will be narrowed down
- The overall project schedule/programme

### *A1.2 THE ENVIRONMENTAL IMPACT ASSESSMENT (EIA)*

- The integral role of the EIA in the development process (ie as a part of design and a demonstration of commitment, not just for obtaining permits)
- The EIA as a precursor to the EMP and to SPDP's HSE Management System (HSE MS)
- Production of the EIA and EMP

### *A1.3 SCOPE OF THE EIA REPORT*

- A definition of scope including: the receptors, geographical area, time-scales, showing how this EIA fits into the whole project development process and links with the other EIAs being carried out in parallel
- Detailed discussion of which aspects of the EWEIA are covered by the EIA (eg logistics)

### *A1.4 EIA APPROACH AND METHODOLOGY*

- Details of national and international environmental standards
- Recognition of SPDP's HSE policies, guidelines and programmes
- The consultative approach
- The team
- Detailed description of steps which have been undertaken in the production of the EIA including key milestones
- The key criteria used in evaluating environmental impacts and assessing their significance

### *A1.5 STRUCTURE OF THE ENVIRONMENTAL IMPACT ASSESSMENT*

- Brief description of what each Chapter contains

#### ***A1.6***

#### ***STRUCTURE OF THE ENVIRONMENTAL MANAGEMENT PLAN***

- Description of the structure and function of the Environmental Management Plan (EMP)
- Its overall context within SPDP's HSE MS
- EMP structure - separate EMP's for construction, operation and decommissioning
- Contingency planning
- Implementation mechanisms for the EMP's

#### ***A1.7***

#### ***CONTRIBUTORS TO THE EIA AND ACKNOWLEDGEMENTS***

## **A2                    *LEGISLATIVE AND INSTITUTIONAL FRAMEWORK***

### **A2.1                *INTRODUCTION***

- Importance of EIA in Peru

### **A2.2                *LEGISLATIVE FRAMEWORK FOR ENVIRONMENTAL PROTECTION***

- Overview of applicable national legislation and international conventions.
- Applicable Standards (Peruvian and International)

### **A2.3                *INSTITUTIONAL FRAMEWORK FOR ENVIRONMENTAL MANAGEMENT***

- Overview of the institutional framework in Peru for controlling the environmental aspects of this type of development

### **A2.4                *EIA REQUIREMENTS AND APPROVAL PROCESS***

- Detailed review of EIA requirements in Peru
- The review and approval process (eg public hearings)



## **A3 PROJECT DESCRIPTION**

### **A3.1 SITE SELECTION AND PROJECT RATIONALE**

- Why this project is taking place
- SPDP's commitment to Block 75 and how this EW fits into the overall picture
- How will the 5 sites studies in the EIA be narrowed down to favoured options following EIA and technical reviews

### **A3.2 PROJECT OVERVIEW**

- An introduction to the components of the project covered by this EIA illustrated by a schematic diagram
- Sites will be clearly shown on maps

### **A3.3 PROJECT SCHEDULE**

- Project timetable barchart with discussion of the main events

### **A3.4 LOGISTICS OVERVIEW**

- Use of existing logistics at Nuevo Mundo
- Rationale for heli-supported operations

### **A3.5 LESSONS LEARNED FROM THE APPRAISAL DRILLING CAMPAIGN (ADC)**

- Environmental management and pollution control measures in place
- Need for more landtake (wellsite footprint)
- Other SPDP commitments already enshrined in the on-going ADC
- How the above will be added to in terms of specific environmental management issues from the EIA (eg contingency planning, risk management)

### **A3.6 WELLSITES: CLEARANCE AND CONSTRUCTION**

- Requirements for wellsites (eg helipad, workers camp, generators)
- Access and Transport
- Site clearance and management
- Site Preparation and Installation of Wellsite Facilities
- Use of Local Resources
- Storage of Fuels and Chemicals
- Surface Drainage
- Waste and Effluent Management
- Community Safety, Disturbance and Workforce Conduct

- Noise Disturbance
- Workforce Numbers
- Timing

### **A3.7** *WELLSITES: DRILLING AND TESTING*

- Drilling Methodology
- Well Evaluation
- Drilling Safety and Well Control
- Flaring
- Management of Drill Cuttings, Muds and Other Procedures
- Storage of Fuels, Lubricants and Chemicals
- Community Safety and Disturbance (eg flaring)
- Workforce Numbers

### **A3.8** *DEMOBILISATION*

- Overview
- Removal of Equipment and Materials
- Restoration of Footprint (eg erosion control measures, remediation plan)

### **A3.9** *ABANDONMENT*

At the end of the exploratory drilling the well heads and ancillary facilities will be decommissioned. A complete reclamation plan will be provided in the EMP to address abandonment and reclamation of the exploratory wellsites. The plan will include a monitoring programme to ensure the restoration is effective and long term.

### **A3.10** *EMERGENCY PLAN*

An emergency plan will be provided in the EMP to address emergences and the need for contingency planning.

## **A4 CONSULTATION PROGRAMME AND OTHER ACTIVITIES**

### **A4.1 OVERVIEW**

- SPDP's approach to consultation
- Consultation which will have been carried out by ERM specifically as part of the EIA (and EMP) process
- Other activities related to the EIA process or which have had inputs to it

### **A4.2 THE CONSULTATION PROGRAMME**

- Overview of the different steps in the consultation programme
- Identification of the key stakeholders and their participation in the consultation programme

### **A4.3 PRIMARY STAKEHOLDER CONSULTATION**

- Summary of key concerns and views
- Outstanding issues

### **A4.4 SECONDARY STAKEHOLDER CONSULTATION**

- Summary of key concerns and views
- Outstanding issues

### **A4.5 PUBLIC ACCESS TO THE OUTCOME OF THE EIA PROCESS**

- Public Hearing
- Public Documents

### **A4.6 ONGOING CONSULTATION DURING PROJECT IMPLEMENTATION AND OPERATION**

**A5.1 INTRODUCTION AND METHODOLOGY**

- Existing conditions in project area
- Key sources of information
- Description of scope of field surveys, team members and timings
- Description of any difficulties which were encountered and any perceived gaps in the baseline data
- Definition of the study area

**A5.2 OVERVIEW OF THE ENVIRONMENTAL SETTING**

- Physical setting
- Ecological setting
- Socio-cultural setting

**A5.3 PHYSICAL ENVIRONMENT**

- Climate
- Geology
- Soils
- Topography
- Geomorphology
- Hydrogeology
- Hydrology
- Water Quality (surface and groundwater)
- Noise

**A5.4 BIOLOGICAL BASELINE ENVIRONMENT**

The presently limited knowledge of the biodiversity of the project area will in part be extended via a study being carried out by the Smithsonian Institution. The EIA will report on this study and carry out further biological research on *indicator species* in collaboration with Peruvian experts covering:

- flora;
- terrestrial fauna;
- aquatic ecology and fisheries;
- endangered and threatened species;
- economically important species;

This section of the EIA will provide information on social, cultural and economical characteristics of the local communities.

- *Socio-Cultural Characteristics*: background to the different groups of peoples in the study area, their history, language, current population, social structure, education and livelihoods. Full use will be made of *SIEP Social Impact Assessment Guidelines*.
- *Land Use and Community Resources*: which resources are used by the local communities and their overall importance in the context of the FFDP. Land use and ownership will consider both official and traditional land tenure.
- *Community Infrastructure*: transport, utilities, public services etc.
- *Local Government and Community Organisation*.
- *Communities and Health*. An independent assessment of the existing health situation in the Upper Amazonian region from the Pongo Mainique to Atalaya has been sponsored by SPDP and was completed in August 1996. The results have been made public. A 5 year plan outline has been prepared based on priorities. Results (as appropriate) will be incorporated in the EIA.
- *Education*.
- *Utilities*.
- *Cultural Heritage*. Information will be gathered through the involvement of an archaeologist in the project team.

### A6.1 ASSESSMENT OF IMPACTS

- Identification and Classification of Potential Impacts.
- Assessing the Significance of Impacts on the Environment.
- Classification of Impacts.
- Ecological Impact Assessment Criteria.

### A6.2 IMPACTS ON THE NATURAL ENVIRONMENT - DRILLING

- *Range of Impacts:* A full description of the range of impacts as it effects each of the following:
  - *geophysical impacts* (eg increased risk of land slippage/slumping and accelerated soil erosion, interruption of subsoil and overland drainage patterns, alteration of soil quality by loss of topsoil; contamination of soils by spillages).;
  - *surface and groundwater quality* (eg potential water discharges, earthworks and deforestation, fuel spills, waste handling and disposal, extraction of building materials from river beds);
  - *air quality* (eg dust from earthworks, particulate matter from diesel-powered generators, emissions from flaring during well testing);
  - *flora and fauna* (eg loss of species from direct landtake, indirect damage from soil erosion, noise disturbance, on-site personnel movements, illumination from night-time lighting, helicopter movements, waste storage and disposal);
  - *landuse* (eg loss of potential productive lands, loss of areas suitable for logging, loss of areas used for cultural purposes);
  - *resources and infrastructure* (eg affected community water supply, gravel/sand extraction, loss of trails due to interference, glare from flaring).
- *Cumulative Impacts:* The significance of the cumulative (or additive) effects of all the potential impacts noted above will be assessed. It could be that whilst mitigation reduces single impact 'categories' to acceptable levels, that there may still be residual effects that when added to other impact categories sum up to a significant level of impact which in turn requires further mitigation.

### A6.3 IMPACTS ON THE NATURAL ENVIRONMENT - LOGISTICS

- *Range of Impacts:* A description of the effects caused by helicopter transport and increased river traffic on such receptors as surface water, wildlife, soil quality, ambient noise and air quality.
- *Cumulative Impacts:* Same as above

- *Range of Impacts:* A full description of a range of potential impacts will be included, eg:
  - direct loss of economic resources;
  - landtake of productive lands;
  - contamination of drinking water supplies;
  - human health impacts;
  - loss or damage to archaeological sites;
  - increase in employment and income generation;
  - provision of health and education services;
  - interaction with communities;
  - cultural change;
  - inward migration.
- *Cumulative Impacts:* same as above

## **A7                    *KEY ISSUES AND CONCLUSIONS***

### **A7.1                *SUMMARY OF RESIDUAL IMPACTS***

The key findings of the EIA will be summarised. Impacts remaining after mitigation will be discussed in terms of their significance and uncertainty, together with the need for further actions such as monitoring, contingency planning, further studies.

### **A7.2                *IMPLEMENTATION OF THE EMP***

The EIA will conclude with an account of the procedures that SPDP will adopt, through implementation of the EMP, to translate the findings of the EIA process and the commitments contained in it into action.



## Appendix B

# Annotated Contents List for the Pagoreni/San Martin East Exploratory Well EMP

## **B2** *ENVIRONMENTAL MITIGATION AND MONITORING*

### **B2.1** *ENVIRONMENTAL MITIGATION*

### **B2.2** *ENVIRONMENTAL MONITORING*

This section will be supported by a number of tables associated with mitigation and monitoring of wellsite construction and drilling impacts, as well as for community effects and community relations.

The tables will include the potential impact, the necessary mitigative action required, who is responsible for undertaking that action, how it can be monitored for effectiveness and when it should happen.

### **B2.3** *ENVIRONMENTAL INSPECTION AND REPORTING*

This section will be supported with an example of an Environmental Inspection checklist and Environmental Report Proforma.

## **B3**                    ***ABANDONMENT AND MONITORING PLAN***

### **B3.1**                ***INTRODUCTION***

### **B3.2**                ***ABANDONMENT PLAN***

- Plans to reclaim following abandonment of the wellsite footprint

### **B3.3**                ***MONITORING PLAN***

- Key monitoring parameters that need to be implemented to ensure that the reclamation is both effective and long term
- Plan to include potential impact, action required, institutional responsibility, and timing

## **B4**                    **CONTINGENCY PLANNING AND ENVIRONMENTAL RISK ASSESSMENT**

### **B4.1**                **INTRODUCTION**

### **B4.2**                **OBJECTIVES OF CONTINGENCY PLANNING AND ENVIRONMENTAL RISK ASSESSMENT**

- Key Principles
- Emergency situations that require contingency planning
- The Environmental Risk Approach

### **B4.3**                **OUTLINE EMERGENCY RESPONSE AND CONTINGENCY PLAN**

- Response Strategy
- Contingency Plans for specific emergency responses

### **B4.4**                **ENVIRONMENTAL INCIDENT REPORTING**

This section will be supported with an Incident Report Proforma.

### **B4.5**                **ENVIRONMENTAL TRAINING**

This section will be supported by an Environmental Management Training Programme for SPDP Contractors.