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Camisea Project

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ENVIRONMENTAL AND SOCIAL IMPACT REPORT

(ESIR)

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TABLE OF CONTENTS

1.0 INTRODUCTION

2.0 PROJECT DESCRIPTION

2.1 Previous Camisea Activities
2.2 Upstream Component
- 2.2.1 Seismic Survey
- 2.2.2 Gas Wells
- 2.2.3 Flowlines
- 2.2.4 Gas Processing Plant at Las Malvinas
- 2.2.5 Worker and Base Camps
- 2.2.6 Fractionation Plant
- 2.2.7 Marine terminal

2.3 Downstream Component
- 2.3.1 Associated Equipment
- 2.3.2 Transportation, Access Roads and River Crossings
- 2.3.3 Logistics
- 2.3.4 Supporting Activities
- 2.3.5 Principal Construction Activities
- 2.3.6 Operation and Maintenance

2.4 Distribution Component
2.5 Project Workforce
2.6 Project Schedule and Cost
2.7 Alternative Analysis
- 2.7.1 Upstream Component
- 2.7.2 Downstream Component
- 2.7.3 Distribution Component

3.0 INSTITUTIONAL FRAMEWORK

3.1 Institutional
- 3.1.1 Energy Sector
- 3.1.2 Environment
- 3.1.3 Health and Safety
- 3.1.4 Indigenous Peoples
- 3.1.5 Cultural Issues

3.2 Legal
- 3.2.1 Energy
- 3.2.2 Environmental
- 3.2.3 Indigenous Peoples and Cultural Resources
- 3.2.4 Health and Safety
- 3.2.5 Content and Approval Process of EIA

3.3 Other Requirements
3.4 Project Compliance Status
- 3.4.1 The EIA Process

3.4.2 Permits and Authorizations

4.0 ENVIRONMENTAL AND SOCIAL CONDITIONS

4.1 Environmental
- 4.1.1 Rainforest
- 4.1.2 Highlands
- 4.1.3 Coast

4.2 Social-Economic
- 4.2.1 Rainforest
- 4.2.2 Highlands
- 4.2.3 Coast

5.0 ENVIRONMENTAL AND SOCIAL IMPACTS

5.1 Construction
- 5.1.1 Downstream Component
- 5.1.2 Upstream Component
- 5.1.3 Distribution Component

5.2 Operation
- 5.2.1 Downstream Component
- 5.2.2 Upstream Component
- 5.2.3 Distribution Component

5.3 Positive Impacts

6.0 ENVIRONMENTAL, SOCIAL HEALTH AND SAFETY MANAGEMENT

6.1 Environmental, Social and Health and Safety Project Design Criteria

6.2 Environmental, Social and Health and Safety Management during Construction
- 6.2.1 Upstream Component
- 6.2.2 Downstream Component
- 6.2.3 Distribution Component

6.3 Environmental, Social and Health and Safety Management for Operations
- 6.3.1 Upstream Component
- 6.3.2 Downstream Component
- 6.3.3 Distribution Component

6.4 Monitoring and Supervision
- 6.4.1 Monitoring
- 6.4.2 Supervision

6.5 Resources for Environmental, Social and Health and Safety Management

6.6 IDB Public Sector Loan for the Institutional Strengthening of GOP

7.0 INFORMATION DISCLOSURE AND PUBLIC CONSULTATION

7.1 Upstream Component
- 7.1.1 Gas Extraction and Processing Facilities
- 7.1.2 Fractionation Plant and Marine Terminal

7.2 Downstream Component

7.3 IDB Public Consultation and Participation Plan

8.0 RECOMMENDATIONS

8.1 Standard IDB Private Sector Environmental and Social Requirements Applicable to the Camisea Project

8.2 Camisea Project -Specific Environmental and Social Provisions

8.2.1 Technical provisions for Downstream and Upstream Components

8.2.2 Conditions for Financial Closure

8.2.3 Conditions for Disbursement

8.2.4 Conditions for Technical Completion and Project Completion

8.2.5 Financial Mechanisms

8.2.6 GOP Letter of Commitment

8.3 Camisea Project Supervision

TABLES

1-1 Development History of Camisea Reserves
1-2 IDB Involvement to Improve the Camisea Project Environmental and Social Sustainability
3-1 Ambient Air Quality Standards
3-2 Air Emission Standards
3-3 Water Quality Standards
3-4 Waste Water Discharge Standards
3-5 Noise Standards
3-6 Permits for Downstream Component
3-7 Summary of Block 88 (Upstream) EIA Approval Process
5-1 Length and Surface Area to be Cleared and Volume of Usable Timber
5-2 Classification of Vegetation Cleared for the Upstream
6-1 Ecologically Sensitive Zones
7-1 Pre-EIA and EIA Consultations for the Upstream, Downstream and Distribution Components

FIGURES

2-1 Map of the Camisea Project Components
2-2 Map of the Camisea Project
2-3 Map of the Native Communities and Rural Settlements Living in the Area of Influence of Block 88
2-4 Alternative Pipeline Routes (Lower and Upper Urubamaba)
4-1 Map of Gas Pipeline (Downstream Component)
4-2 Map of Protected Areas in the Urubamba Basin

ANNEXES

A List of Pipeline Route Variations
B List of Public Consultations for the Downstream Component (Year 2002 and 2003)
C List of Public Consultation for the Upstream Component
D Pre-EIA and EIA Public Consultation for the Fractionation Plant and Marine Terminal

ACRONYMS AND ABBREVIATIONS LIST

AAC	Autoridad Ambiental Competente
ACPC	Asociación para la Conservación del Patrimonio Cutiverini
AMTIC	Ambient Monitoring Technology Information
ANP	Areas Naturales Protegidas
ANSI	American National Standards Institute
API	American Petroleum Institute
ASME	American Society of Mechanical Engineers
BMP	Best Management Practices
BPD	Barrels per Day
CAF	Corporación Andina de Fomento
CECAM	Special Committee for the Camisea Project
CECONAMA	Organization of Machiguenga Native Communities of the Lower Urubamba
CEDIA	Center for the Development of Indigenous Peoples
CIRA	Certificado de Inexistencia de Restos Arqueológicos
CITES	Convention on International Trade of Endangered Species
COMARU	Machiguenga Council of the Urubamba River
CONAM	Consejo Nacional del Ambiente
CONAPA	Comisión Nacional de Pueblos Andinos y Amazónicos
CONATA	Comisión Nacional de Tasación
CRP	Community Relations Plan
CR1	Cashiriari 1
CR3	Cashiriari 3
DCH	Diameter at Chest Height
DGAA	Dirección General de Asuntos Ambientales
DGH	Dirección General de Hidrocarburos
DICAPI	Dirección General de Capitanías y Guardacostas
DIGESA	Dirección General de Salud Ambiental
EIA	Environmental Impact Assessment
EMP	Environmental Management Plan
EMTI	Emission Monitoring Technology Information
EPC	Engineering, Procurement, Construction
ERM	Environmental Resources Management
ERP	Emergency Response Plan
ESIR	Environmental and Social Impact Report
ESHSM	Environmental, Social and Health and Safety Management
ExIm	U.S. Export Import Bank
FECONAYY	Yine Yami Federation of Native Communities
GDP	Gross Domestic Product
GNLC	Gas Natural de Líquidos de Camisea
GOP	Government of Peru
GTCI	Grupo Técnico de Coordinación Inter-Institucional
HS	Health and Safety
HSP	Health and Safety Plan
IDB	Inter-American Development Bank
IESM	Independent Environmental and Social Monitoring
INC	Instituto Nacional de Cultura

INRENA	Instituto Nacional de Recursos Naturales
IUCN	International Union for Conservation of Nature
JP-5	Jet Fuel
Kw	Kilowatt
Kp	Kilometer Post
KP	Knight Piesold
MEM	Ministerio de Energía y Minas
MMBls	Million Barrels
MMcfd	Million cubic feet per day
MMscfd	Million standard cubic feed per day
Masl	Meters Above Sea Level
MTC	Ministry of Communication and Transportation
NACE	National Association of Corrosion Engineers
NG	Natural Gas
NGL	Natural Gas Liquids
NGO	Non-Governmental Organization
OSINERG	Organismo Supervisor de la Inversión en Energía
PEIS	Preliminary Environmental Impact Study
PCPP	Public Consultation and Participation Plan
PiP	Pipe in Pipe
PM	Particulate Matter
PMAC	Community Environmental Monitoring Program
POC	Plan Operativo de Contingencia
PPCM	Plan de Prevención, Corrección y/o Mitigación
PRC	Plan de Relaciones Comunitarias
Psig	Pounds per square inch gauge
RAMSAR	Convention on Wetlands of International Importance
RAP	Red Ambiental Peruana
ROW	Right-of-Way
SACE	Instituto per i Servizi Assicuratavi del Comercio Externo
SCADA	Supervisory, Control, and Data Acquisition System
SIA	Social Impact Assessment
SM1	San Martín 1
SM3	San Martín 3
SPCCP	Spill Prevention, Control and Containment Plan
SUNARP	National Superintendency of Registry Offices
Tcf	Trillion Cubic Feet
TGP	Transportadora de Gas del Perú
TPH	Total Petroleum Hydrocarbons
USEPA	United States Environmental
VOCs	Volatile Organic Compounds
WB	World Bank
WHO	World Health Organization
ZRA	Zona Reservada del Apurímac

1.0 INTRODUCTION

1.1 The Camisea Project is a principal element of the Government of Peru's (GOP) energy policy and involves the exploitation and transportation of natural gas (NG) and natural gas liquids (NGL) from the Camisea deposits to Peruvian and international markets. The Camisea gas field has proven gas and liquids reserves of approximately 8.7 trillion cubic feet and 545 million barrels, respectively. Gas reserves are estimated to be ten times larger than all other actual known reserves in the country.

1.2 The Camisea Project will represent an important transformation in the energy framework in Peru, as it will make natural gas available to industrial and residential customers. The implementation of the Camisea Project should result in lower electricity tariffs to electricity end-users through the Peruvian marginal cost-based tariff regime. For example, preliminary estimates indicate that approximately US$4.1 billion (in net present value) in energy cost savings over the 2004-2033 period as a result of gas-fired generated electricity replacing less efficient, more costly and polluting oil-fired generation plants. Natural gas liquids will supply the local market and will also be used for export, directly benefiting the trade balance in Peru. Estimates indicate that the development of the Camisea Project may increase output (i.e., production in Peruvian economy) by approximately US$5.4 billion in net present value during the 2004-2033 period. In addition, the government will receive royalties equivalent to 37.24% of the Upstream Component gross revenues (estimated to be US$68.2 million in 2005, with an annual average of US$105.7 million from 2005 through 2015; a significant amount when compared to the Peruvian government's annual budget of US$9.8 billion for 2002). Fiscal income (e.g., royalties, taxes, etc.) over the 2004-2033 period due to the Camisea Project is estimated to represent approximately US$1.3 billion in net present value.

1.3 There is a long history associated with the Camisea reserves, starting in the mid-1980s with the discovery of the reserves (see Table 1-1 for brief summary), which has resulted in significant awareness among Peruvian civil society. During the mid-1990s, Shell undertook various studies and investigations, including the development of an Environmental Impact Assessment, drilling of four test wells, and various other field works. After years of study and work in the area, the Shell consortium announced in 1998 its decision to not continue forward with the development of the reserves. In May 1999, through the Peruvian Special Committee for the Camisea Project (CECAM), *Perupetro* issued separate bid packages for two License Agreements, known today as the Upstream and Downstream Components. The license to develop the Upstream Project was awarded to a consortium formed by Pluspetrol (Argentina), Hunt Oil (USA), SK Corporation (South Korea) and Tecpetrol (Argentina) (the "Upstream Consortium") in February 2000. A consortium led by Tecgas (Argentina) with the participation of Pluspetrol, Hunt Oil, SK Corporation, Sonatrach (Algeria) and Graña y Montero (Perú) (the "Downstream Consortium") was awarded the development of the Downstream and Distribution Projects in October 2000 and signed three concession contracts with the Government of Peru (GOP) as follows: one for the transportation of natural gas from Camisea to Lima; a second for the transportation of natural gas liquids from Camisea to the coast; and a third for the distribution of natural gas in Lima and Callao. In May 2002, Transportadora de Gas del Peru (TGP) chose Tractebel as the operator of the Gas Distribution Company, which makes Tractebel responsible for the Distribution component (construction and execution).

1.4 The present Camisea Project can be considered to consist of three components: (i) exploration and exploitation of gas deposits in Camisea, including a gas processing plant at Las Malvinas and a gas fractionation plant and an marine terminal for NGL (Upstream Component); (ii) transport of natural gas from Las Malvinas to the City Gate in Lurín (approximately 714 km of pipeline) and natural gas liquids from Las Malvinas to fractionation plant and marine terminal proposed for the South of Pisco (approximately 540 km of pipeline) (Downstream Component), and (iii) distribution of natural gas to Lima and Callao (Distribution Component).

1.5 The Camisea Project consists of an estimated investment of approximately US$1,531 million dollars. This corresponds to approximately US$811 million for the Downstream Component, approximately US$670 million for the Upstream Component, and approximately $US50 million for the Distribution Component. The IDB is considering a loan of US$75 million for the Downstream Component, and the *Corporación Andina de Fomento* (CAF) is considering an a loan of US$50 million. Financing for a portion of the Upstream Component has been from the US Export-Import Bank (ExIm), the export credit agency of the United States, and from SACE (*Instituto per i Servizi Assicuratavi del Comercio Externo*), the export credit agency for Italy, for equipment and services exported from these countries that are required for the project.

1.6 The IDB acknowledges that the Camisea Project is located in areas of extremely rich and diverse environmental and social characteristics that warrant very special attention since they could be significantly negatively impacted if the Camisea Project is not properly developed, constructed and operated. The IDB has implemented extensive actions in order to help improve the environmental and social sustainability of the Camisea Project, including (see Table 1-2 for summary) (i) an extensive environmental and social due-diligence of all three project components using various IDB internal and external specialists; (ii) requiring numerous improvements in terms of environmental, social and health and safety mitigation and monitoring for all Components; (iii) requiring expanded analysis of potential impacts and risks and increased information disclosure, public consultation and civil society participation; (iv) requiring enhanced supervision during construction including independent monitors, community monitors, GOP monitors and IDB monitors, which are full-time in the field; and (v) in conjunction with the GOP the development and implementation of a loan (1441/OC-PE) to enhance the GOP institutional capacity to monitor the environmental and social aspects and to address priority activities that are the GOP's responsibility to mitigate potential indirect effects.

1.7 Associated with the Camisea Project, there has been extensive participation of civil society, including local Peruvian indigenous and non-indigenous communities and organizations, and Peruvian and international non-governmental organizations (NGO's). This participation has been extremely helpful in identifying negative and positive aspects and has resulted in various improvements and changes in the Camisea Project. This civil society participation was an integral part of, and significantly contributed to, the IDB due-diligence.

1.8 The Environmental and Social Impact Report (ESIR) presents a summary of the environmental, social, and health and safety aspects associated with all three components of the Camisea Project and the proposed IDB environmental, social and health and safety requirements. The ESIR is only a summary and does not attempt to provide all the details from all of the numerous existing project-related sources of information and documentation,

which is particularly relevant to the Camisea Project in which there are numerous and extensive studies, reports and information. The ESIR consists of the following sections:

- Section 2 – summary description of the three Components of the Camisea Project, including an analysis of alternatives;
- Section 3 – summary of key institutional and legal environmental, social and health and safety requirements applicable to the Camisea Project, including a compliance status;
- Section 4 – summary of the principal environmental and social conditions associated with the Camisea Project;
- Section 5 – summary of the principal potential environmental, social and health and safety impacts and risks associate with the Camisea Project;
- Section 6 – summary of the measures to control, mitigate, compensate and monitor the environmental, social and health and safety impacts and risks associated with the Camisea Project;
- Section 7 – summary of the information disclosure and public consultation associated with the Camisea Project; and
- Section 8 – summary of the IDB proposed environmental, social and health and safety requirements for the Camisea Project.

2.0 PROJECT DESCRIPTION

2.1 The Camisea Project consists of the extraction and processing of natural gas (NG) and natural gas liquids[1] (NGL), their transportation from the Camisea fields to the coast through two pipelines, one for natural gas and another one for gas liquids, and their distribution to Peruvian and international markets (see Figure 1). Specifically, the Camisea Project can be considered to consist of the following three components.

- The Upstream Component, which consists of the exploration and exploitation of gas deposits in Camisea and processing at Las Malvinas and a gas fractionation plant and marine terminal for NGL proposed for south of Pisco, all under the responsibility of a multinational consortium lead by Pluspetrol.
- The Downstream Component, which consists of the transport of NG from Las Malvinas to the City Gate[2] in Lurín (approximately 715 km of pipeline) and NGL to Pisco (approximately 540 km of pipeline), under the responsibility of Transportadora de Gas del Peru (TGP).
- The Distribution Component), which consists of the distribution of NG in Lima and Callao for industrial, commercial and residential use, under the responsibility of Tractebel.

2.2 The Camisea gas deposits are made up of two fields, San Martín and Cashiriari, located in Block 88, which is approximately 430 km from Lima in the Peruvian Amazon in the Lower

[1] About Natural Gas & Gas Liquids: Natural gas is a hydrocarbon comprised of two parts - a light gas component and a heavier gas liquids component. The light gas consists of methane, while the liquids consist of ethane, propane, butane, isobutane and natural gasoline. Before most natural gas is marketed to a distributor or an end-user, it is processed to remove the natural gas liquids (NGLs), which usually have more value on their own than when left in the natural gas. The product that results after NGLs are removed, consist of methane, which is the natural gas used as heating and cooking fuel. After NGLs are removed from natural gas, they are reprocessed in a unit called a fractionator to break them out for individual sale as propane, butane and other products.

[2] The terminus of the gas pipeline (Downstream Component) and beginning of the Distribution component.

Urubamba region (see Figure 2-1). The estimated size of the reserves of the fields is approximately 8.7 Tcf (Trillion cubic feet) of gas and 545 MMBls (Million Barrels) of gas liquids. The development of the Camisea gas fields started nearly twenty years ago, with the discovery of the gas fields in the mid 1980s by Shell Petroleum. In the 1990s, Shell drilled four exploration wells in Block 88, two in each of the fields that make up the Camisea reserve.

2.3 For the current Camisea Project, the gas and associated liquids will be extracted from the deposits through a series of production wells at four sites and then transferred via flowlines to a processing (cryogenic) plant in Las Malvinas for initial separation of gases and liquids. Excess gas will be reinjected back into the productive reserves.

2.4 The NG and NGL will be transported from Las Malvinas across the Departments of Cusco, Ayacucho, Huancavelica, Ica, and Lima (see Figure 2-1). The two pipelines will be buried, with the exception of the Comerciato River crossing, and will cross three environments: rainforest or rainforest area with elevations varying between 300 and 2,800 meters above sea level (masl) in the rainforest region, sierra or Andes area with elevations up to 4,800 masl, and coastal area with elevations less than 50 masl. Natural gas will be transported to the main consumption center in Lima, where it will be used for industrial and residential purposes and to generate electricity that will then be distributed nationwide through Peru's existing transmission infrastructure. NGL will supply the domestic market and will also be exported. A fractionation plant, located south of Pisco in the Paracas Bay, will process the gas liquids into individual gas liquids products (propane, butane, gasoline, etc.) and then they will be transferred and loaded at an marine terminal.

2.5 Initial distribution of NG to Lima and Callao will reach approximately 10,000 clients concentrated mostly in the industrial and commercial sectors and possibly the electric/energy sector. The NGL will be exported via the proposed fractionation plant and marine terminal.

2.6 In compliance with the commitments assumed by the sponsor companies with the Government of Peru, commercial operations in Lima will begin in August of 2004.

2.7 A summary description of each project component is provided in Sections 2.2, 2.3 and 2.4, respectively, with a focus on the Downstream Component, which is being considered by the IDB for partial financing. Various aspects of the Camisea Project have been designed specifically to reduce or eliminate environmental and social impacts or risks including minimizing land use and access roads (e.g., "offshore inland operations"), pipeline route selection criteria, directional drilling of gas wells, initial installation of large capacity pipeline (over initial demands) in the rainforest area, and pipeline safety (see Section 6.1 for details). The Camisea Project work force is summarized in section 2.5 and schedule and cost are summarized in Sections 2.6. Section 2.7 provides a brief description of alternative analysis performed associated with each component.

2.1 Previous Camisea Activities

2.8 The development of the Camisea reserves began when they were discovered between 1983 and 1987, during the exploration activities performed by Shell. In March 1984 the San Martín structure was discovered and followed by the drilling of the two wells (San Martín-1 and San Martín-3). Two years later the Cashiriari structure (south from San Martín) was discovered and also followed by the drilling of the two wells (Cashiriari-1 and Cashiriari-3).

2.9 Shell's presence lasted for approximately 15 years, from 1983 to 1998. At the time of Shell's withdrawal from the area, various field works had been performed:

- An exploratory drilling program had been performed (until 1987) at the four wells;
- The geotechnical (soil and subsurface investigation) and topographical surveys had been completed;
- The logistic base in Nuevo Mundo had been installed for the seismic works;
- A temporary camp in Las Malvinas had been upgraded to provide accommodation for the crew that would build the campsite; and
- Detailed pipeline routing survey was undertaken for the flowlines (between Las Malvinas and the San Martín and Cashiriari fields) and for the proposed route for the pipelines, in two spreads beginning at Pueblo Libre in the Apurímac River: the first spread to Las Malvinas; and the other through the rainforest, the highlands and down to the coast.

2.10 As part of Shell's activities, various studies and documents in relation to environmental and social assessment and management were prepared. With regard to the local community involvement, in the last two years of Shells presence in the area, Shell carried out rounds of consultation among the 44 settlements between Atalaya and Pongo de Mainique, and signed a number of compensation commitments (e.g., contracts for use of the land and compensation from impacts from helicopters flight and river traffic).

2.2 Upstream Component

2.11 The Upstream Component consists of the exploration, drilling and production of natural gas and natural gas liquids from the reserves of the San Martín and Cashiriari fields, transport of NG and NGL via flowlines 58 km to the gas processing plant at Las Malvinas, processing at the plant and delivery to two pipelines for transport of NG and NGL to Lima and delivery of excess gas back to the wells for reinjection[3]. Also included in the Upstream Component is a gas liquids fractionation plant and marine terminal proposed to be located south of Pisco.

2.12 The two fields San Martín and Cashiriari are located approximately 500km east of Lima within the Block 88 concession area (See Figure 2-3), which is east of the Urubamba River, in the Department of Cusco. Block 88, with an approximate area of 1,435km^2 is located in the remote Amazonian rainforest of the Lower Urubamba River, amidst two zones internationally recognized for their high biodiversity: the Apurímac Reserve and the Manu National Park to the east. Roughly 1200km^2 of Block 88 falls within the lands reserved by the State for the benefit of the nomadic groups Nahua-Kugapakori (see Section 4 for details), including three of the production well locations. The area (footprint) to be utilized as part of the project gas field and associated facilities will actually be around 10km^2 (excluding temporary work camps and seismic drop sites), which makes up less than 1% of the total Nahua Kugapakori reserve (44,438 km^2).

2.13 The fractionation plant and marine terminal facilities are proposed to be located south of Pisco, in the district of Paracas, Department of Ica. The site is located in the area known as Playa Lobería in the Bay of Paracas.

[3] Reinjection of the less commercially viable production gases into the reservoir formation is a standard procedure used to help maintain necessary production pressures in the reservoir

2.14 The Upstream Component consists of the following elements (which are described in subsequent sub-sections):

- Seismic surveys within Block 88;
- Construction and operation of four well clusters for gas extraction and re-injection at pre-existing well platforms (San Martín 1, San Martín 3, Cashiriari 1 and Cashiriari 3);
- Construction of flowlines between the well pads and the gas processing plant at Las Malvinas;
- Construction and operation of gas separation and condensation facilities at Las Malvinas; and
- Construction and operation of a natural gas liquids fractionation plant and the marine terminal.

2.2.1 Seismic Survey

2.15 The seismic survey was conducted between February and October of 2002 and consisted of an initial topographic survey, placement of source and receiver lines, construction of charge wells, acquisition of the seismic results, followed by the reclamation and closure of areas opened for the seismic survey.

2.16 The 3-D seismic survey, which has been fully completed, covered a grid within an area of 765 km^2 within Block 88 (roughly 53% of the total 1,435km^2 block area). The purpose was to obtain information on the stratigraphic sequences of the formations, so that production zones could be identified. The survey area was designed to minimize the area of encroachment on the Nahua-Kugapakori Reserve, and included two reductions in the original 1,200 km^2 area planned for the survey (see Section 5 and 6 for details). Additional seismic surveys are not required for Block 88.

2.17 Seventy-five helipads and approximately 600-drop zones were established to transport the equipment. The helipads were established one per an area of 4 km^2 and were approximately 50 m by 40 m wide. These areas were cleared of vegetation (helipads comprised <0.0003% of the total area). The drop zones were smaller (6 meters by 6 meters).

2.18 The topographic survey established the location of the grid along which the source and receiver lines would be set. Source lines were aligned in an East-West orientation, and spaced 400 meters from each other. The receiver lines were aligned North-South and spaced 300 meters. Along the source lines (approximately 1-meter width), 15-meter deep test holes were drilled and primed with small dynamite charges. The receiver lines were set with geophones to record the blasting of charges.

2.19 As of October 2002, all of the seismic survey had been completed, and all facilities including the Peruanita Camp and the helipads had been dismantled. The areas that were cleared for the helipads, drop zones, source lines and receiver lines had all been closed, and re-vegetated. At Peruanita Camp site, most of the temporary installations were removed and some buildings were left in place at landowner's request.

2.2.2 Gas Wells

2.20 The Camisea field had previously been explored by Shell Petroleum and exploration wells had been drilled and abandoned at four previously cleared well pads: San Martín-1, San Martín-3,

Cashiriari-1 and Cashiriari-3. The pre-existing well pad locations have been designated SM-1, SM-3, in the San Martín field and CR-1 and CR-3 in the Cashiriari field. SM-3, CR-1 and CR-3 lie within the southwest corner of the Nahua-Kugapakori Reserve.

2.21 The four well pads will be cleared of new vegetative growth and enlarged (from 3 to 7 hectares each) to accommodate the drilling platform, dwelling accommodation, sludge pits, drilling water storage, areas for treatment of drilling mud, pipe racks, storage areas for cement and other chemicals, take-off area for helicopters, and fuel storage areas.

2.22 All wells will be drilled using directional drilling, a relatively new technology that allows the drilling of several wells (e.g., cluster) from the same platform on the well pad, thus minimizing the need for additional well pads. Each well is initiated from the same well pad within a few feet of each other, while the wells themselves extend into a wider area below the ground surface. Pluspetrol's use of directional drilling to exploit the gas field reduces the need for the building of new access routes and flowlines. The required drilling equipment, drill rods, materials, supply, fuel, associated infrastructure (tanks, drilling mud treatment tanks, computer equipment, lodging facilities, and others) are transported into the same drill-pad by either helicopter or truck and are maintained for the duration of the drilling and completion of all of the wells within the cluster. Five production wells have been drilled at SM-1. In addition, there will be four gas injection wells in total, three in the San Martín Field, installed for reinjection of excess gas to assist with reservoir maintenance.

2.23 The drilling fluid being used for the Camisea Project is a water base drilling mud, and thus can be easily treated and disposed with minimal risk to the environment. Chemicals used for mud preparation are non-toxic. The feasibility of re-injecting drill cuttings was assessed, and cuttings will not be re-injected due to unsuitable subsurface geological conditions, well construction and formation properties. A solids control system efficiently removes most drilled solids from the drilling mud as the well is drilled, resulting in less dilution and less waste to dispose. Mud is reused as much as possible, and excess mud that cannot be reused is sent to the de-watering system, which separates the solids and water. The solids phase is disposed of with the rest of the drilled solids and the water used as dilution or to prepare new mud. The fluids produced from the drilling process are collected and treated in the water treatment system to comply with environmental discharge standards, and discharged at different points.

2.24 The four production locations (SM-1 and SM-3, and CR-1 and CR-3) will be drilled in phases. A total of 20 production wells drilled from the four well pads are planned: 10 in the San Martín field and 10 in the Cashiriari field. As of June 2003, drilling of SM-1 cluster has been completed (with five production wells at depths varying between 2,500 to 3,000 meters below ground surface) and work has initiated on SM-3 where three reinjection wells will be drilled. The drilling of CR-1 and CR-3 is presently planned for after the year 2004. The seismic results indicated that additional well pads/platforms are not required to achieve the expected production levels from the Camisea fields beyond the four well clusters. It is anticipated that the production and reinjection wells can be serviced from the same location. Upon completion and commissioning of the wells, the cleared areas will be revegetated and only minimal clearing will be maintained for future well servicing.

2.2.3 Flowlines

2.25 A flowline network will be constructed to transfer gas and liquids from the well platforms in the San Martín and Cashiriari fields to the Las Malvinas plant. The total distance of flowlines is approximately 58 km.

2.26 In the San Martín field, natural gas and associated gas liquids from the SM-3 well pad will be pumped via flowlines to the SM-1 location. At SM-1 the product of both the SM-1 and SM-3 locations will be mixed and the product sent to the processing plant at Las Malvinas. Similarly in the Cashiriari field, CR-3 product will be sent to the CR-1 location where the product of both the CR-1 and CR-3 well locations will be mixed and sent to Las Malvinas. The gas and liquid flowlines from each field are combined along the route to Las Malvinas at a junction node approximately 20 km east of Las Malvinas.

2.27 The 16 km section of the flowline right-of-way (ROW) from SM-1 to the Camisea River is approximately 25m wide and is aligned along the access road previously built by Shell Petroleum. The flowline ROW segment from the Camisea River to the Las Malvinas Plant (10 km long and approximately 20 m wide) is being aligned along a new ROW that Pluspetrol had cleared. As of June 2003, the flowline between SM–1 and Las Malvinas (26 km in length) was nearly complete. Once construction of the facilities is complete, and there is no need to move large equipment, only four to five meters of the ROW will be used for maintenance of the flowline and access to the SM-1 production well cluster. The ROW crosses the Camisea River where Pluspetrol built a 70 m long temporary bridge during 2002. In addition, to flowlines, a 4-in diameter flowline has also been installed along this ROW to transport diesel for power to the SM-1 well cluster. Additional ROW will be cleared for the flowline from SM-1 to SM-3 (approximately 8 km). Flowlines to CR-1 and CR- 3 platforms will be installed in 2004. Upon completion of the construction of flowlines, the ROW will be closed, but a narrow path will be maintained throughout the operational life of the project for walking inspections.

2.28 The flowline construction process includes route selection and ROW survey, clearing and grading, trenching, stringing and bending, welding and field joint coating, pressure testing, waterbody crossings (streams, rivers, wetlands, etc.), lower-in and backfill, reclamation (cleanup, restoration, and revegetation). Hydrotesting will be used to test the integrity of the completed flowlines. One set of tests has already been conducted for completed sections, and for those tests, water with corrosion inhibitors and oxygen scavengers was used. The water was tested for general water quality parameters (e.g., color, pH, dissolved solids, dissolved oxygen etc.) and then discharged to the Camisea and Urubamba rivers.

2.2.4 Gas Processing Plant at Las Malvinas

2.29 The gas processing plant is located outside of Block 88 at Las Malvinas, a site situated on the eastern bank of the Urubamba River. The area of the Las Malvinas Plant had previously been cleared, but was expanded for the plant and supporting facilities. As part of the installations at the plant, an 1,800 m long airstrip, a heliport, fuel depot, and ancillary systems are included with a total surface area of approximately 72 hectares. Pluspetrol had also acquired an area of approximately 2,000 hectares around the Las Malvinas Plant as a buffer zone and where no additional construction is envisioned.

2.30 At the plant, gas will be processed by physical separation and cooling (turbo-cooling). The gas liquids will be stored in cryogenic tanks prior to being pumped for delivery to the gas liquids

pipeline to the coast (as part of the Downstream Component). Operations will start by August 2004, with an initial production of approximately 400 MMcfd and 21 thousand barrels/day of gas liquids. As more production is required, the plant will be expanded to process increased capacities. Two additional cryogenic units are planned of 220 MMcfd-capacity each, which will increase the plant's production capacity to 840 MMcfd around the year 2008 and the final production capacity of 620 MMcfd for year 2015.

2.31 The major processes and equipment are discussed below.

- The liquid separator unit removes associated liquids arriving at the plant with the produced natural gas. The collected light condensate liquids and water are sent to the condensate stabilization unit. The natural gas is routed to the dehydration unit.
- The condensate stabilization unit separates the condensate (hydrocarbon-water mixture) using a distillation process. The recovered gas liquid is sent to the liquid pressurized storage area and the gases are sent to the dehydration unit. Finally, the separated water stream is sent to a wastewater treatment system.
- The dehydration unit uses a two-step process to remove water and other gas liquids from the gas. The first step is the use of a glycol system, which separates the gas from the water, and the water is then sent to the wastewater treatment system. The gas is further treated through a sieve system to separate further remaining water from the gas.
- In the cryogenic/turboexpansion unit, the propane and heavier hydrocarbons in the gas are separated from the lighter portion (methane-ethane) using extremely low temperatures to progressively cool the gas and separate the condensed liquids. The resulting gas mixture at this point is the natural gas product, which is sent to the compression unit and then transported via the gas pipeline. The remaining liquid products (propane and heavier) are pumped to the pumping installation and gas liquid unit.
- The gas compression unit involves compressing the natural gas to about 2,130 pounds per square inch gauge (psig) and sending it into the main gas pipeline. Some of the gas in this unit is compressed and re-injected into the field to enhance further production.
- The pumping installation for the gas liquid unit consists of pressurized gas liquids storage cylinders, with a total storage capacity of 1,980 cubic meters. The produced gas liquids will be pumped to the fractionation plant at the coast through the gas liquids pipeline.

2.32 The liquid waste effluents from different sources within the Las Malvinas plant will be treated according to the applicable environmental requirements (see Sections 3 and 6 for details). Principal liquid effluents include industrial and run-off water with a certain degree of contamination (mainly by hydrocarbons) and sanitary effluents. The industrial effluents will be treated in a liquid effluent treatment system, including primary and secondary treatment with an induced gas flotation cell that is expected to achieve a 90-97% removal of the insoluble oil/organic material and floating solids. A sanitary effluents treatment system will treat the sewage effluents.

2.33 Solids wastes generated at the Las Malvinas plant include domestic wastes, non-hazardous and hazardous wastes, and pathogenic wastes. Non-hazardous wastes (such as wire, glass, piping, scrap metal etc) will be temporarily stored according to Peruvian legislation and reused and/or recycled at the Las Malvinas plant, as much as possible. The remaining non-hazardous waste will be transported and eliminated or recycled by carriers and waste operators duly authorized by Peruvian environmental authorities . The same procedure will be applied to hazardous wastes (oily waste, spent solvents, paint tins, etc, and other materials contaminated

with hydrocarbon). Organic wastes (food, vegetation, etc) will be collected frequently and taken to a waste incinerator at the plant. Pathogenic waste generated at the medical service or infirmaries at Las Malvinas plant will be periodically collected, taken to a specially designated area within the temporary hazardous wastes storage sites, and incinerated on-site in accordance with Peruvian requirements.

2.2.5 Worker and Base Camps

2.34 Base camps and worker camps were established to accommodate workers and provide support services during construction. The Peruanita Base Camp was temporarily established for the seismic survey at a previously cleared site along the eastern banks of the Urubamba River. A temporary worker camp was established at SM-1 for construction activities at SM-1 and will be dismantled. Similar temporary camps will be built for construction activities at SM-3, CR-1 and CR-3. Two temporary camps have been set up on the northern banks of the Camisea River and near the junction node for constructing the flowlines between SM-1 and Las Malvinas. These camps will be dismantled upon completion of construction. The Nuevo Mundo Camp, previously constructed by Shell Petroleum was used as a worker camp until the Las Malvinas Camp was completed, and as fluvial transportation control point and refueling station.

2.35 The Las Malvinas Camp is the primary camp of the Upstream Project, with complete facilities to accommodate and support the work teams and management (including housing, offices, power supply generators, fuel storage, waste water treatment, waste disposal etc).

2.36 For the construction of the fractionation plant and the marine terminal, no worker camps will be required.

2.2.6 Fractionation Plant

2.37 The fractionation plant that will separate the gas liquids is planned to be located in San Andres, 12 km south of Pisco, in the District of Paracas. The area of the plant is known as Playa Lobería, about 7 km north of the Paracas National Reserve, and within the buffer zone established in 1995. The plant will occupy an area of approximately 44.7 hectares (including the marine terminal facility), within a 244 hectare fenced property. The area is presently open space that has been used to dispose of shellfish (shells) and other wastes.

2.38 No access roads will be provided for the plant during the plant construction. Equipment access to plant will be through the Pan American highway from the east and from the San Martín port from the Pacific Ocean. A direct access road from the rear of the plant to the Pan American highway has been proposed.

2.39 The plant will be designed to receive initially about 112 m^3 of gas liquids per day, with possible expansion in size to about 350 m^3 per day when all production wells are online. The plant will primarily produce propane and butane, but it will also have the capacity to produce natural gasoline, diesel, and jet fuel products with a primary distillation unit. The plant will have refrigeration units to store propane and butane at atmospheric pressure, and conventional atmospheric tanks to store products from the primary distillation unit. The major process units for the fractionation plant are described below.

- The measurement station will meter the incoming gas liquids from the pipeline. The total incoming storage capacity is 25,000 barrels. From this storage area the gas liquids will be pumped to the gas liquids fractionation unit.
- The gas liquids fractionation unit will consist of two fractionation towers, a depropanizer and a debutanizer that will separate the propane, butane, and heavier hydrocarbon components.
- The primary distillation unit will use a distillation processes to separate natural gasoline, jet fuel (JP-5), and diesel into three distinct product streams. Non-condensable gases will be sent to the flare for combustion. The three products will be sent to the atmospheric storage unit.
- The refrigeration system and storage unit uses three identical processing trains, which consist of compression and refrigeration units. There are four stages for each train that eventually produce liquid propane and butane products, which will be sent to storage. Refrigerated storage will consist of vertical and horizontal tanks totaling 30,000 m^3 for propane and 15,000 m^3 for butane. Each tank will be provided with a secondary containment system consisting of an earth berm covered with a liner system with a capacity equivalent to 110% of tank capacity. The propane and butane will be pumped from these tanks to the marine terminal for loading onto the ships.
- The vapor recovery unit will recover the vapors emitted from the refrigerated storage area, condense them into liquid, and return these recovered components to product storage. There will be three vapor recovery units, one for propane, one for butane, and the third will be a standby unit. Each unit has been designed to handle around 8 MMscfd of propane at atmospheric pressure at -20ºF temperature.
- The pressurized storage unit will consist of 4 cylindrical cryogenic tanks (two for propane and two for butane), each with a total capacity of 60,000 gallons. These tanks will serve as storage for tank truck loading operations at the plant.
- The truck load unit will contain a total of eight truck loading units, each capable of loading a truck at a rate of 34 m^3/hour (150 US GPM).
- The atmospheric storage unit will contain storage for the gasoline, JP-5, and diesel products at atmospheric pressure and ambient temperature. The natural gasoline will be sent to the marine terminal for ship loading. The JP-5 and diesel will be loaded into tank trucks for local distribution. The following are the planned storage capacities: gasoline - 440,000 barrels; JP-5 Fuel - 22,500 barrels; and diesel - 75,000 barrels. Each tank will be provided with a secondary containment system consisting of an earth berm covered with a liner. The capacity of the berm will be equivalent to 110% of the tank's capacity.

2.40 The fractionation plant will have the facilities/utilities described below.

- Water and wastewater systems. Water for the site will be obtained from shallow wells at the site, treated, stored and distributed for use in the showers and bathrooms. Potable water will be provided to the plant from outside in 20-liter containers. The fractionation plant will produce three principal types of effluents: industrial effluents generated during the process, run-off water and oily discharges, and sanitary wastewater from approximately 100 employees. The industrial effluents will be collected and transported to an oil-water separation tank. The oily phase will be re-fed into the process, while the watery phase will be properly stored until its collection and transport outside the plant by waste operators duly authorized by the competent Peruvian authorities. Non-industrial liquid effluents include non-oily run-off and sanitary effluents, all of which will be treated in a biological sludge-activated sanitary effluent treatment plant. The treated sanitary

effluents will be then directly discharged into the municipal wastewater collection system of Pisco.

- Solid waste. Three types of wastes will be generated at the fractionation plant: domestic, non-hazardous and hazardous wastes. Domestic wastes will be collected by the public waste service of the municipality of San Andres. Hazardous (including production wastes such as asbestos-containing joints, activated-carbon filters, depleted catalizers, and oily waste) and non-hazardous wastes will be collected by third parties authorized by the Peruvian government for treatment and disposal.
- Fire and gas detection and emergency shut down system. A fire and gas detection system will monitor critical areas of operation. The plant will have a fire extinguishing system consisting of a distribution network pipe, pumps, storage tanks, control valves and hydrants, and portable gas and fire extinguishers. An emergency shut down system will be connected to Las Malvinas plant in case of a total or partial shut down of the fractionation plant facilities.
- Power generation plant consisting of four gas turbine generators (4,400 Kw each).
- Other ancillary facilities will include an administration building; maintenance/storage building; infrastructure for the operations and maintenance workers; a hot oil system to provide heat to the propane and butane towers; gas conditioning and distribution for use by different facilities (obtained from the gas liquids); illumination system for safe working conditions during the night shifts; communication system: telephone/fax connections, emergency radio, and optical fiber communication system with Las Malvinas plant; and a compressed air system for instrumentation and facilities.

2.2.7 Marine Terminal

2.41 The marine terminal will be used to transport products from the fractionation plant to the ships. The pipelines, cable and instrumentation will extend from the fractionation plant to a loading platform, a distance of approximately 4,000 meters. The terminal will consist of a product-loading platform, mooring and berthing "dolphins". Four subsea pipelines will carry the products from the fractionation plant to the loading platform, as well as carry a subsea power and implementation cable for power supply to the loading platform and remote operation control from the fractionation plant. Approximately 3,200 m of pipelines will be underwater. The trench will be 8 meters wide at the bottom, approximately 20 meters wide at seabed level and 2m deep. The pipeline will be buried both on land and in the sea.

2.42 The design includes placement of four pipes, one power cable and submarine instrumentation from the fractionation plant to the loading terminal, located approximately 3200m offshore at 15m water depth. Two of the four pipes for transporting refrigerated propane and butane will be "Pipe in Pipe" (PiP) construction, which is essentially an insulated double-walled 20-inch diameter pipe enclosed within an external 24-inch pipe. Additionally, one 24-inch pipe will transport naptha, and one 10-inch pipe will be installed for the transport of diesel to the loading terminal.

2.43 Construction of the pipelines will involve excavating (dredging) a trench. The trench will be 20 m wide at seabed level and 2 m deep for the four pipes, and will contain all four pipes, which will be bundled together approximately 0.6 meters apart. The trench will be excavated in granular material for the first 1500 m from the shoreline. Beyond that, the granular material is overlain by a layer of fine sediments (ranging in thickness from 0 m to approximately 10 m) up to 3200 m from the shoreline. The pipe bundles will be pulled, 500 m sections at a time, along

rollers placed in the bottom of a leveled trench (pullway) on land and into the sea until sufficient water depth for flotation is reached. Floats will be used in the water to suspend the pipes above the sea bottom during the launching. Pipes will be prefabricated in the plant area, pulled by a tugboat and winches along the rollers/floats, and new 500-meter sections will be welded to the end. Weld joints will be inspected, and the new section pulled along the pullway until the total length is installed offshore. Once in place, the buoyancy devices will be removed and the pipes will drop under their own weight. The pipes will then be buried with the granular material set aside and/or selected imported material. Construction time for this operation will be approximately 10 months.

2.44 The marine terminal will operate with a ship loading capacity of about 3,000 to 78,500 m^3 of refrigerated propane and butane, naphtha and diesel for the national and international markets. In the initial stage (2004-2007), approximately two ships per month are envisioned for the distribution of LPG to other ports in the country, 2 ships per month for the exportation of LPG to Chile and Ecuador, and 1 ship per month for the exportation of virgin naphtha as consumable for the petrochemical industry, possible to the US or Japan. (In the fifth year demand is estimated at 1 ship every 3 days, or approximately 10 ships per month).

2.45 Sea vessels that will transport naphtha will be required to be doubled-hulled. In terms of ballast water, the propane-butane transport vessels will have a permanent system whereby ballast water exchange is not required because it is not discharged, due to the nature of the product (low specific weight). In response to recommendations from the IDB and other stakeholders, Pluspetrol will require that all vessels comply with the State of California applicable regulation: *"California Ballast Water Management Programme"* (e.g., ballast water exchange must be carried out 200 miles from the coast and a minimum depth of 2,000 meters. For internal Peruvian market (vessels sailing only national waters), DICAPI's resolution (*Resolución Directoral* No. 0178-96/DGC) will apply which states that vessels sailing only national waters must exchange ballast water no nearer than 12 miles from the coast.

2.3 Downstream Component

2.46 The Downstream Component comprises two major elements:

1. A natural gas (NG) pipeline from the Las Malvinas Gas Plant to the Lima City Gate, covering an approximate length of 714 Km; and
2. An natural gas liquids (NGL) pipeline from the Las Malvinas Gas Plant to an marine terminal located in Playa Lobería south of Pisco, with an approximate length of 540 Km.

2.47 The two pipelines cover three distinct geographic regions: rainforest (jungle), Andean highlands and coast; crossing elevations varying between 300 and 2,800 masl in the rainforest region, 4,800 meters in the Andes, and 50 meters in the coast.

2.48 The gas pipeline has been designed with an initial capacity (for the 2004 initial startup) of 285 million standard cubic feet per day (MMScfd). The design includes a provision that allows for a future capacity of 1,185 MMScfd in year 2025 that would not require significant additional construction in the rainforest region (e.g., new pipeline). This has been achieved by using 32" piping in this region. The pipeline will be 24" in the Andean highlands segment and 18" in the coastal segment.

2.49 The gas liquids pipeline has a design capacity of 50,000 barrels per day (BPD) of gas liquids. The diameter of the gas liquids pipeline varies between 14" in the rainforest and highland segments, and 10" in the coastal segment.

2.50 Both pipelines will be buried along the entire route. The final design depth varies, depending on the topography, geotechnical, geological and hydrological conditions, and the route fluvial hydraulics. Throughout most of the route, the typical depth-of-cover will range from 0.6 to 0.9 m, except at river and road/highway crossings, and agricultural fields. Where pipe sections run under roads, they will be strengthened and buried deeper. At river crossings, the pipe will be buried (through excavation or horizontal directional drilling) to a depth such that the pipe will not be affected by undercutting or scour. For the pipe sections installed by directional drilling the soil weight will be sufficient to control floating; where the pipe has been installed through excavation, concrete weights, anchorages or a continuous concrete coating will be used for flotation control. There will be one aerial river crossing over River Comerciato.

2.51 The approach for construction and operation of the Downstream component is to minimize the creation of new roads and access points to the ROW by maximizing transport by air and river, and using existing roads. One single right-of-way (ROW) is being used for both pipelines. The average ROW is 25-meters wide but is narrowed to a nominal ROW width of 20 meters in the ecologically sensitive areas of the Apurímac Restricted Zone, the mountain forests along the right bank of the Apurímac River, high Andean marshlands (*bofedales)*, and desert columnar cactus areas along the coastal zone. Nevertheless, additional ROW width (extra workspace) is needed at some steep slopes, side slopes, rocky areas, and at roadway and water-body crossings, to provide a staging / layout area for pipe and equipment, as well as to provide additional space to stockpile larger volumes of excavated trench soil to accommodate the increased depth-of-cover requirements for these locations.

2.3.1 Associated Equipment

2.52 *Pumping stations and pressure reducing stations*. The pumping and pressure reduction stations and the scrapper trap locations were selected based on technical (e.g., engineering design for reliability and safety, accessibility for operations and maintenance) and environmental factors (e.g., minimal clearing of vegetation and other disturbance). The pumping stations are designed to maintain the inlet pressure over the set pressure and the outlet pressure below maximum operation pressure to ensure optimum pressure of the pipeline contents: there will be three pumping stations and two pressure reduction stations for the gas liquids pipeline; and one additional pressure reduction station and pressure control station that will service both pipelines. The pumping stations will include the following equipment and installations: scrapper launching and reception traps, pumping units with natural gas powered engines, electric generator (natural gas and diesel powered) and energy distribution system and lighting system, fuel gas treatment and distribution system, fire detection and fighting equipment, compressed air system, communication and control system, wastewater collection, treatment and disposal system, hydrocarbons drainage closing system and flare, and office/control room. The closed drainage system will be installed to handle oily water (small leaks, valves meters etc.) The system will be equipped with a liquid elimination drum and all the gas generated will be flared. The flare will be equipped with an automatic ignition system, which will ignite the released gas when required. The pumping station at Las Malvinas will have a measurement system for gas and gas liquids and a water supply, treatment and

distribution system to meet the requirements for potable water. The water supply source will be underground.

2.53 *Supervisory, Control, and Data Acquisition System* (SCADA) is a system with automatic equipment that continuously monitors volumes, pressures and temperatures as well as the operating status of pipeline facilities. In addition to providing ongoing status information, the SCADA will activate the shut-off valves upon a detection of pressure drop, which is an indication that there may be a leak.

2.54 *Scrapper*s will be used for internal cleaning and inspection of the pipelines. They are put into the pipelines at scrapper launchers and removed at scrapper traps. There will be one launching trap in Las Malvinas and one receiving trap in Lurín. Seven intermediate scrapper and launching traps will also be installed along the pipeline route. Scrapper systems will be designed in accordance with ANSI B31.4 and B31.8 standards.

2.55 *Block Valves* will be used to control the flow through the pipeline. On the gas pipeline there will be 27 block valves installed at intermediate stations, and for the gas liquids pipeline there will be 18 block valves at intermediate stations. The blocking valves for the gas and gas liquids pipelines and other fittings will comply with ASME Class 900 or 600, as required by the hydraulic design calculations, and are located along the route as required by ANSI B31.4 and B31.8 standards. The valves have gas-activated operators capable of both local and remote control, as necessary, and are connected to the SCADA system.

2.56 *Corrosion Control*. The pipelines will be of steel, covered with a polyethylene coating during manufacturing to provide protection against external corrosion. During installation, the joints will be covered after welding with a coating material compatible with the one applied at the factory. To provide additional external corrosion protection for the pipelines, a cathodic protection impressed current system will be installed in accordance with the NACE (National Association of Corrosion Engineers) RP 0169 standard. Cathodic protection systems are designed to limit corrosion of steel pipes and other underground metallic structures.

2.3.2 Transportation, Access Roads and River Crossings

2.57 Access to the ROW is done principally through existing roads that were improved or by using the ROW itself for access. For example, in the rainforest region, more than 90% of the length of the pipeline ROW itself is being used for access during construction. No access roads were incorporated in the design between Chimparina and Las Malvinas. Existing roads used include the Cusco-Calca-Quellouno-Kiteni highway for the Alto Urubamba area in the rainforest include the Los Libertadores highway for the highlands, and the Panamerican Highway for the coast. Traffic in these access roads will mainly consist of trucks transporting equipment and materials to the work fronts.

2.58 The pipe for the rainforest section of the Lower Urubamba is transported to Las Malvinas by means of 350-ton barges traveling approximately 50 km upstream from Pucallpa on the Ucayali and Urubamba Rivers. Water transportation is only possible from January to March, since barges can only navigate the Urubamba River during the rainy reason. Barges are used to transport pipes and construction equipment from the Ucayali-Urubamba rivers to the docks at Las Malvinas. For other pipeline sections, pipes are delivered by ship to the port of Pisco.

Ground transportation is then used to deliver the majority of the pipes from the arrival port to the main pipe storage yards, which are located along the length of the ROW.

2.59 From Cusco to the Kiteni Base Camp, materials and equipment are transported through the Cusco-Calca-Quellouno-Kiteni road. The surface roads have been improved, the curves widened, and traffic signs installed to improve road safety. From Kiteni, two existing roads have been improved to access the Kepashiato and Chimpiarina campsites: the Kiteni-Kepashiato and Kiteni-Chimpiarina roads, respectively. From these campsites, the ROW is used as access to the construction fronts. Approximately 3 kilometers of temporary new road were constructed from a branch of the Kiteni-Chimpiarina road to access pump station 2. The road traverses Monte Carmelo territory and TGP agreed with the community that only local natives can use it. After construction is completed, this road will be reduced to a trail path for the community to reach their agricultural plots.

2.60 The pipelines will traverse thirty principal rivers or gullies along the route. The major river crossings are: in the rainforest sector, the Mantálo, the Urubamba, the Apúrimac and the Acroco Rivers; in the highland sector, the Torobamba, Vinchos, Sachapampa and Pampas Rivers; and in the coastal sector the Pisco, Chico, Cañete and Mala Rivers. All water crossings will by traditional cut and fill practices, with the exeption of the Urubamba River where the pipe will be installed by horizontal directional drilling.

2.3.3 Logistics

2.61 Due to difficulties imposed by the torrential rains in the rainforest, construction work in this region is limited to the one dry season per year (approximately April to October). The construction of the pipelines has been programmed to be carried out in the various stretches of the rainforest, highlands and coast simultaneously.

2.3.4 Supporting Activities

2.62 *Campsite*s. Due to the lack of commercially available housing and infrastructure along the pipeline route, construction crews are housed and fed at temporary construction camps located immediately adjacent to the proposed route. There are a total of 11 work camps along the ROW. Between two and four construction camps are in operation simultaneously, each with a footprint of 4 to 6 ha located on open ground as much as practical, to minimize impacts to primary forest. Each camp houses, on average, an estimated 600 employees.

2.63 Prior to establishing camps, an agreement is reached with the landowners to obtain and use water. As the pipeline construction progresses, the camps will be dismantled and reinstalled elsewhere. The camps operate based on an "offshore policy", meaning workers may not leave the camp without supervisor consent. The purpose of this policy is to prevent conflicts arising from the presence of workers, especially near villages.

2.64 Camps are provided with portable dormitories and mess halls, a small workshop, fuel storage tanks, and water tanks. The camps have diesel-powered electrical generators operating 24 hours a day. The amount of water required for these purposes is variable, depending on the number of men present and the hours worked. Wastewaters from showers, bathrooms and kitchens are treated by the use of septic tanks and percolation areas.

2.65 Camp waste is generated principally by food preparation. Waste is stored in covered drums, which will be emptied periodically and the waste taken to the site of final disposal following the requirements set in the Waste Management Plan (see Section 6 for details). All organic waste is placed in compost piles installed in each camp. The compost produced will be used as a soil amendment during camp abandonment and reclamation. Inorganic waste is sorted and periodically transported to authorized landfill sites. Industrial wastes, such as lubricants, are transported to a specialty contractor for final handling and disposal according to the Waste Management Plan.

2.66 *Quarries*. Because of the absence of commercial quarries in the rainforest region, sand, gravel and rock is extracted from dry riverbeds and gravel bars at eight locations (the Apurímac River, the Cumpirusiato River, the Mantálo River, and five gullies along the ROW). Quarry material is used primarily for improving the surface of the ROW and the temporary access roads and for fine material needed for bedding the pipeline. During extraction, materials are removed from the exposed bar surface and dry streambeds (i.e., not from the actively flowing stream), without disturbing groundwater. The quarries located in riverbeds are worked in during dry conditions.

2.67 *Water Use:* Water is used for campsite uses, to compact the surface where necessary, and for hydrostatic testing of the pipeline. Water is obtained from rivers and other surface water sources adjacent to the project. The water is pumped from the water sources into tank trucks, to be transported to the campsites, to construction areas or pumped directly from the source location into the pipeline for purposes of hydrostatic testing. Potable water is obtained by treatment of the raw water in treatment plants installed in each campsite.

2.3.5 Principal Construction Activities

2.68 The principal pipeline construction activities are summarized below.

2.69 *Right of Way Permits and Acquisition.* Construction of the pipelines requires the acquisition of the right-of-way on the necessary lands.

2.70 *Surveying*. A route survey is conducted to select the best route within the established corridor, avoiding to the greatest possible extent sensitive natural and cultural features and terrain obstacles. Alternative corridors are compared for constructability, access, and safety. A final route is selected within the corridor and the final layout fine-tuned based on constructability, access and construction safety.

2.71 *Clearing*. Once the route is surveyed, the ROW for construction is delimited depending on site-specific conditions. Existing vegetation within the construction ROW is cleared using machetes for small vegetation and chain saws for trees more than 20 cm in diameter. Trees larger than 20 cm in diameter are cut down to fall within the ROW. The majority of cut trees are used for building the right-of-way embankments. The stumps are removed using backhoes and bulldozers, as will trees smaller than 20 cm. in diameter. Tree trunks have their branches removed and are stacked on one side of the roadway in order to retain the soil used for fill. No organic waste from this stage in the construction is incinerated.

2.72 *Leveling:* The ROW is graded in areas where a leveled surface is necessary for the safe passageway of the equipment and to reduce the number of vertical pipeline bends. In order to

minimize the environmental impact generated by clearing the ROW, the width and slopes are just wide enough to allow the machinery and special construction equipment to operate and move safely. In areas where there is a hillside cut, soil movement is minimized by executing a cut which will allow a 15 m wide road to be built on firm land, with the remaining 10 m of width filled and contained by the cut vegetation. This filled area is used as a support road. In areas were the gradient of the ROW exceed 20%, road shoe-flies are built for safe access of material and personnel. Grading is done with bulldozers and backhoes. The excavated material is stacked on one side of the ROW, the vegetation cover material and the organic soils are stored separately from the subsoil, away from watercourses. When required, temporary and permanent soil erosion and sedimentation control measures are installed. Embankments adjacent to the ROW are built to ensure stability against erosion. Surface water drains are also built along the length of the route.

2.73 *Trenching*. Trenches are opened using backhoes or trenchers. When required, the use of explosives is performed in compliance with Peruvian regulations. The trench depth complies with ASME standards established for the distance between the top of the pipeline and the ground level (from 90 cm to 2 m, depending on the terrain and the land use). Material dug out of the ditch is stockpiled along the ROW on one side of the trench for easy access during back-filling.

2.74 *Soil Erosion and Control Measures.* During construction, temporary erosion and sediment control measures are implemented. These are performed on temporary access roads (longitudinal and cross section), right-of-way, river and road crossing areas, where construction is conducted on soils highly susceptible to erosion or unstable, and at locations where significant runoff is expected. The erosion and sedimentation control measures are summarized in Section 6.

2.75 *Stringing*. Pipes are transported by truck from the general storage area to the pipe yards spaced along the ROW, where they are stored on temporary supports. The pipes are then aligned next to the excavated trench in one continuous line, allowing easy access for the construction personnel. The pipes are placed on the left side of the road on the trench ridge. In cut areas, pipes are placed next to the cut leaving a 1.5-m space. In locations with steep slopes, the pipe is placed in temporary storage locations. At river crossings, the number of pipes required to cross the river is stored in temporary workspaces at one or both sides of the river. At each location, pipes are securely placed on top of sacks filled with soil. At approximately each 500 meters, an open space is left in the pipes string to allow fauna and cattle crossing.

2.76 *Bending*. Pipe bending is performed on site (or at the pipe yards) to allow the pipeline to follow the vertical grade changes and the horizontal changes of direction of the route.

2.77 *Welding*. After the stringing and bending, the pipes are placed on temporary wooden supports on one side of the ditch. The ends of the pipes are carefully aligned and welded by welders qualified under API (American Petroleum Institute), ANSI or ASME specifications. The pipes' rows have an approximate length of 500 m. Welding wastes (electrodes, wire, brushes, wire brush, glass, etc.) are collected, stored and disposed of in accordance with the Project Waste Management Plan (see Section 6).

2.78 *Lowering.* The welded pipeline is lifted from its temporary supports by cranes and lowered into the opened ditch. Before the pipe is lowered, the trench is inspected to make sure that it does not have any rock or other material that may damage the pipeline or its lining. After lowering the pipe into the trench, the pipe is inspected to ensure that the anticorrosive coating is not damaged and that the pipe is aligned within the trench.

2.79 *Backfilling.* After the pipeline has been placed in the ditch, it is covered with the soil removed during excation. In case there are large rocks or other material that can damage the pipe, a protective layer is placed around the pipe before back-filling the trench. The material is compacted with a backhoe. A small hump is left to compensate for any settling that may occur in the future. When required temporary soil erosion and sedimentation control measures are then installed. The removed vegetation, separated during excavation, is placed on the ROW to help revegetation.

2.80 *Pressure test and final tie in*. After completing welding and lowering of the pipe into the trench, the pipe is cleaned and measurements are made to verify the pipe diameter. A test is performed on the pipeline according to the standards of ASME B31.4 and B31.8 to ensure that it withstands the design pressure. The tested portions of the pipeline are sealed and filled with air or water. Where water is used, ventilation inlets are installed at high points and drainage outlets are placed at low points to facilitate filling. The length of each test segment is determined by the topography and water availability. Rivers are not used if more than 30 percent of their normal flow is required to complete a hydrostatic test or if it compromises water use downstream. Any significant pressure loss not attributable to outside factors indicates a leak in the pipeline. Any detected leak is repaired and that segment is retested. After completing the test, test water may be pumped to the following segment for testing or it is discharged. If the test water is going to remain in the pipeline for more than 60 days, corrosion control, oxygen scavengers, and biocide chemicals are added. Before disposing of the water, appropriate tests are carried out to evaluate if it complies with Peruvian regulations. In the event that the water quality does not meet the required limits for discharge to surface water, it is placed in an evaporation lagoon.

2.81 *Closure and restoration.* After having successfully tested a segment of the pipeline and back-filling the ditch, closure and restoration proceeds. This phase involves the collection and removal of construction waste (cleanup), grading to restore original or engineered land contours (restoration), and seeding and planting of vegetation to stabilize the restored right-of-way and other work areas (revegetation). One primary focus of closure and restoration is to permanently stabilize disturbed soils. Backhoes are used to restore the profile of hills on top of the vegetation remaining from the ROW clearing. Erosion and sediment control measures will be implemented, including revegetation and ditch construction. Revegetation and access control of the ROW will be completed according to the Revegetation Plan (see Section 6 for details).

2.82 *Fuel* for construction machinery is delivered directly to the work sites, principally by tank truck, from the fuel storage yard or the construction camp. Maintenance activities, such as oil changes and lubrication, are carried out on site by specially outfitted trucks.

2.3.6 Operation and Maintenance

2.83 The operation of the pipelines will involve the continuous monitoring of pipeline conditions via the SCADA.

2.84 The right-of-way will be periodically inspected using reconnaissance flights and ground patrols. These are intended to inspect the right-of-way for significant erosion that may require mitigation, leaks not detected by the leak detection systems, vegetation changes which may indicate a leak, changes in soil stability along the route, pipe lengths exposed due to erosion or water courses, operation and calibration of the cathodic protection system, use of the right-of-way by unauthorized parties and other conditions which may represent a safety hazard (such as excavations or structures), or require preventive maintenance or repairs. The SCADA system, the leak detection systems and the flow control valves will also be inspected with appropriate maintenance and calibration conducted.

2.85 Routine maintenance will be primarily limited to the ROW and inspection, repair and cleaning of the pipeline. Maintenance of the ROW will be ongoing including cutting and trimming the vegetation. Revegetation of the ROW will be conducted, although, large bushes or trees with a diameter larger than 4 centimeters will be periodically removed. Trees or bushes with long roots will not be permitted within 1 m of the pipelines, since they may damage the pipe, block routine patrols or interfere with possible repairs. The frequency of vegetation maintenance will depend on actual growth. Most of the vegetation maintenance will be completed during ground patrol routine visits. Any additional maintenance will be scheduled as required. Normally, vegetation control will not be required in agricultural areas. No herbicides will be used for right-of-way maintenance.

2.86 Each pipeline will be internally cleaned periodically, pushing a device called a scrapper (also called "pigs") to remove accumulated solid material on the pipeline walls. The scrapper is a flexible plug the same diameter as the pipeline interior and it is forced through the pipe by pressure from the gas or gas liquids. In addition to the scrappers used to clean the pipelines, a "smart" scrapper will periodically be used to measure wall thickness to detect evidence of internal corrosion. This device allows repair crews to precisely locate pipeline sections that require service.

2.4 Distribution Component

2.87 The Distribution component consists of the construction and operation of a natural gas distribution system in Lima and Callao. The distribution network begins at the City Gate (the final point of the natural gas pipeline) and ends at the Terminal Station in Callao (District of Ventanilla).

2.88 The distribution pipeline network will be buried along roadways, public utility corridors and other existing ROWs. The network consists of a 62-km long distribution pipeline and a lateral connection of approximately 25 km. Additionally, compression plants, pressure control stations, pigging facilities and block valves will be installed in various parts of Lima and Callao. The terminal station will be located in the District of Ventanilla, in Callao, and will be equipped with pressure control devices that allow for efficient management during emergencies or during emergency situations due to over-pressure conditions.

2.5 Project Workforce

2.89 During the construction period, the Upstream component has employed approximately 1,900 workers. The construction of the fractionation plant and marine terminal is expected to employ 300 to 600 workers.

2.90 For the Downstream component, an estimated 6,000 workers will be required during peak construction. Approximately 80 percent are from local communities of the Departments of Cusco, Huancavelica, Ica and Lima. Over 600 workers have been involved in the implementation of the soil erosion control measures prior to the rainy season in 2002.

2.6 Project Schedule and Cost

2.91 The Camisea Project consists of an estimated investment of US$1,531 million dollars. This corresponds to approximately US$811 million for the Downstream Component, approximately US$670 million for the Upstream Component, and approximately $US50 million for the Distribution Component.

2.92 Project construction began in March 2002 and commercial operation is planned for August 2004, according to the concession contracts. As of June 2003, the following construction had been completed on the Downstream component: approximately 80% has been graded, for the gas liquids and gas pipelines; 57% of the gas liquids and 40% of the gas pipelines have been trenched; and 62% of the gas liquids pipeline and 38% of the gas pipeline has been stringed. Welding is 52% advanced for the gas liquids pipeline and 33% for the gas pipeline. Finally, lowering and backfilling is completed for 44% of the gas liquids pipeline and 22% for the gas pipeline.

2.93 According to the license agreements, the Camisea Project is to be operational by August 2004. As of June 2003, approximately 60 percent of the Downstream component has been completed. Specifically for the Upstream, major earth and civil works have been completed at Las Malvinas. Well cluster SM-1 has been completed and the associated flowline to Las Malvinas. Ground clearing has started at the fractionation plant. Field work on the principal gas distribution facilities has commenced.

2.7 Alternative Analysis

2.7.1 Upstream Component

2.94 *Gas wells and associated facilities*. Pluspetrol examined project alternatives for various aspects of the project features in Block 88. In general, the objective was to utilize previously cleared areas to the extent feasible and minimize the additional clearing and intrusive activities required for the project. Examples of specific decisions to reduce environmental and social impacts taken include:

- Limiting the seismic survey area only to 765 km^2 in order to reduce potential contacts with persons living in the Nahua-Kugapakori Reserve;
- Use of previously cleared well platforms SM-1, SM-3, CR-1 and CR-3 and the previously cleared flowline ROW between SM-1 and Camisea River;
- Use of directional drilling and thus not require any additional/new well platforms;
- Use of previously cleared areas for the Peruanita and Las Malvinas Camps; and
- Use of the existing Nuevo Mundo Camp.

Fractionation Plant and Marine Terminal Site Selection

2.95 Pluspetrol initiated the alternative site analysis in 2001, when a number of hydrographic, oceanographic and environmental studies were developed. An alternative site analysis study and an EIA for a selected site was presented to GOP in August 2002. Based upon a review of these studies, IDB recommended the need for improvements in the alternative analysis and the EIA and for a better process, in terms of public participation. Pluspetrol modified these studies and various public consultations were held, including fourteen consultation meetings between September 2002 and January 2003. In addition, GOP held two formal public hearings in Ica on January 27 and 28, 2003 related to site selection for the fractionation plant and marine terminal (see Section 3.3 for details on GOP approval process for EIA).

2.96 Based on a specific set of 16 technical and environmental criteria, Pluespetrol conducted a survey along 250 km of the Peruvian Coast, from Pisco to Playa Conchan in Lima. Initial reconaissance was performed for 14 sites: Mar U, Punta Ñave, Playa Sarapampa, Playa Centinella, El Hondillo, El Cóndor, El Silencio, Cruz Verde, 24 de Junio, Playa Camacho, La Palmilla, Playa Lobería, Las Palmitas and Punta Pejerrey. The technical and environmental assessment criteria involved various factors, such as protection from waves and winds, marine bathymetry, seabed geology, and marine currents. Adequate protection from waves and winds was one of the most important criteria for the marine terminal, given the restrictions on loading operations and the need to minimize risks during these operations. After a screening process of the 14 initial sites, 5 sites were selected for more detailed analysis.

2.97 The evaluation of the five potential sites consisted of engineering and risk/hazard factors and environmental and social factors. The engineering and risk/hazard analysis evaluated the potential sites, with a particular emphasis on whether a proposed site had characteristics that would be unacceptable in terms of the levels of engineering risk/hazards required for the plant and terminal. The environmental conditions considered included land use, water quality, oceanographic conditions, depth, wave state, access to the site, access to utilities, security and others. Environmental conditions were weighted with respect to the other conditions and ranked from most to least important. At each site these parameters were classified according to the risk of being impacted. A brief summary of the five sites is presented below.

- *Alternative 1: Playa Centinela*: Playa Centinela, Cerro Azul, is approximately 133 km south of Lima along the Pan American Highway. This site is characterized by a flat surface with gravel material along the shoreline. Small hills surround the area and currently a quarry site is being exploited for construction material. The presence of small islands close to the beach attenuates the action of the sea waves, and protects the area; regardless some form of breakwater would be required. Due to the requirement that the minimum water depth for docking is 12.5 m, the distance from the beach to loading point would be approximately 1,500 m.
- *Alternative 2: Playa Pampa Clarita*: Playa Pampa Clarita, San Vicente, is approximately 159 km south of Lima along the Pan American Highway. The site area has steep slope cliffs and gravel material. The shoreline area is open to the sea and, therefore, exposed to the direct action of the sea waves. A breakwater would be required to make the terminal acceptable. Distance to the loading point would be approximately 1,600 m. Quality of seabed sediments indicate that construction works would generate significant turbidity.

- *Alternative 3: Playa El Silencio*: Playa El Silencio, Chincha Alta, is approximately 190 km south of Lima along the Pan American Highway. The site presents a flat surface with sandy material, and the area is extensive. The would require a breakwater structure. Access to the site is easy from the highway. Distance to the loading point will be approximately 4,700 m for this alternative. Quality of seabed sediments also indicate that construction works would generate significant turbidity.
- *Alternative 4: Playa Camacho:* Playa Camacho, in the District of San Clemente, is approximately 220 km south of Lima along the Pan American Highway. The site is a gentle flat surface with sandy material. Access to the site more difficult than to other sites, and the distance to the loading point would be approximately 6,500 m.
- *Alternative 5: Playa Lobería*: Playa Lobería, Paracas, Pisco, is 250 km south of Lima along the Pan American Highway. The Paracas National Reserve is located just south of this site. The site presents a flat surface with sandy material. Access to the site is easy from the Pisco-Paracas paved road. Close to the site there are other active terminal ports. The site is within the Paracas bay that protects the area from the open sea waves. Distance to the loading point would be approximately 2,700 m for this alternative.

2.98 Based on the analysis, Pluspetrol determined that only two sites were acceptable in terms of engineering risk criteria: Playa Lobería and Playa Centinela. Playa Centinela, however, is located in one of the busiest recreational areas in Cerro Azul, where residents from Lima visit all year around. This area is renown for the surfing, which contributes heavily to the local tourism based economy. The installation of the marine terminal would require some form of breakwater and thus would significantly impact these current land and sea uses permanently and irreversibly.

2.99 Playa Lobería is located between Pisco and Paracas, 10 km from the northern limit of the Paracas National Reserve and within the Reserve's buffer zone. The Paracas Bay in this area has been impacted due to other activities in the area, including commercial fishing companies. For example, there are odors from the fish mills, water effluents are discharged in the ocean with limited treatment, and used scallop and gastropod shells are discarded all along the area. In addition, there are other activities within this area, and within the buffer zone of the Reserve (defined as north to the Pisco River and east to the Pan American Highway), such as a petroleum product loading installation (buoy system with underground pipe) and other industrial activities.

2.100 Pluspetrol's reviewed the legal aspects and concluded that there are no impediments for the installation of industrial activities in the buffer zone of the Paracas National Reserve, provided that the appropriate measures are in place to mitigate all and each potential negative environmental impact (as established in the Peruvian legislation that allows for the creation of buffer zones for protected areas). It was also based on a review of the existing management plan for the Paracas National Reserve. In relation to designation of the Paracas National Reserve under the Ramsar Convention[4], of which Peru is a signatory, the site is not inside the Reserve, but within its buffer zone, where there are no legal restrictions. In addition, the convention specifically recognizes the exclusive sovereign rights of the signatory countries in

[4] The Convention on Wetlands of International Importance especially as Waterfowl Habitat (Ramsar Convention) was adopted in Ramsar, Iran, in 1971, and came into force in 1975.

whose territory the wetland is situated and require that each signatory country formulate and implement their planning so as to promote the conservation of the area included in the Ramsar Convention, and as far as possible the wise use of wetlands in their territory. This concept of the necessary protection should be reflected in the management plan for the Reserve and the associated definition and aspects related to the buffer zone.

2.101 Pluspetrol selected the Playa Lobería site given that the site would have less environmental and social impacts than Playa Centinela. Pluspetrol has developed an EIA for this site, which was submitted to the GOP for review. On April 2, 2003 INRENA approved the proposed site, subject to the subsequent presentation of additional studies. On April 4, MEM/DGAA issued the conditioned Permit (*Resolución Directoral* 173-2003-EM/DGAA), approving the on-shore facilities (Fractionation plant) but conditioning the approval of the marine terminal facilities to the subsequent presentation of a number of additional studies (see Section 3.3 for details).

2.102 Other environmental and social benefits will originate from the mitigation and compensation measures that will be implemented or supported by Pluspetrol associated with the installation of the fractionation plant and marine terminal in Pisco. Among these are financing for the Master Plan for the Paracas National Reserve; implementation of environmental education programs; support to develop adequate waste management and wastewater treatment; and to improve the environmental and social conditions in the Bay of Paracas and of the artisan fisheries.

Marine Terminal Design

2.103 Based upon comments received during public consultations related to the marine terminal, an alternative to the berth and docking facilities was examined. The original design consisted of a pier structure. Subsequently, in order to reduce environmental and social impacts (e.g., visual impacts on the landscape and coastline, potential hindrance to the navigation of local fishing boats), a new alternative design was proposed consisting of a submarine pipe to an offshore loading platform.

2.7.2 Downstream Component

2.104 *Main Corridor/Route Selection.* Two main routes/corridors were initially evaluated: a north route which would go from Las Malvinas and directly to Lima, and a south route which would go from Las Malvinas to Pisco and up to Lima. The South Route was selected due to cost, commercial opportunities, environmental, health and safety, logistical and construction considerations.

2.105 The original route in the rainforest section that was used as the basis of the call for tenders for the License Agreement was along the right bank of the Urubamba River, passing by the Pongo de Mainique. Based upon the EIA prepared by TGP, the Center for the Development of Indigenous Peoples of the Amazon (CEDIA) proposed an alternative 156 km-long variation to a section of the route.

2.106 Alternative routes for the Downstream component were assessed based on physical, ecological and socio-economic criteria such as: minimization of social and cultural impacts; maximization of pipeline safety and reliability, avoiding features like steep gradients, unstable

terrain, and active creeks; minimization of impacts on important or fragile habitats, primary forest, residual forest; and protected natural areas and seeking routes that cross areas with greater human intervention; avoidance of populated areas, areas with isolated or native populations, urban areas or areas of urban development or areas containing important urban infrastructure; reduction of the number of river crossings; avoidance of areas where there is a potential for archaeological finds; and maximization of existing access roads to avoid the construction of new accesses.

2.107 Based on consultation with the local communities and authorities, and due to the area's importance to the Machiguenga culture, the route was changed to the left bank of the Urubamba River. The revised left bank route (Cumpirosiato route) crosses the southeast end of the former Apurímac Reserve Zone.

2.108 The project design was also altered from locating the pipeline ROW in the rainforest section from the lower parts of the valleys to the upper portion (valley peaks) in order to reduce potential access along the ROW.

2.109 During construction in 2002, four additional alternative routings at selected sites were implemented: (i) a 36.8 km Pacobamba alternative route through secondary forest and rural communities was designed to avoid the primary forests between km 156+178 and 192+225 in the Chunchubamba river watershed; (ii) Aendoshiari alternative, approximately 15 km long, proposed to avoid native community and minimize impacts on forest; (iii) Pisco River alternative, approximately 53 km long, to reduce construction impacts; and (iv) Cañete alternative, approximately 19.5 km long, to avoid drainage systems along the coast.

2.7.3 Distribution Component

2.110 For the Distribution component, which is mainly in the urban areas of Lima and Callao, alternative routes were studied taking in consideration a number of applicable criteria, such as: residential and commercial density; existence of informal residences and commerce; traffic flows; river crossings; density of potential users; and interference with public services and buildings, among others.

2.111 Two alternatives were studied. Alternative 1 was to route the pipeline mainly along main streets, through urban areas densely populated, and where there is no need to build new access routes. Alternative 2 was to route the pipeline mainly along the low areas of the mountains, where informal populations have established, and where access roads are insufficient. In some portions, both alternatives follow the same route, and they both initiate at the City gate in Lurin and end at the terminal station in Ventanilla, Callao. Alternative 1 was selected based on the fact that although it would have greater environmental impacts during construction (all of which could be adequately mitigated), it would have more benefits during operations given the number of potential users. Alternative 2 would have greater social impacts during construction (resettlement of informal dwellers) and less positive impacts during operations.

3.0 INSTITUTIONAL AND LEGAL FRAMEWORK

3.1 Institutional

3.1.1 Energy

3.1 The Ministry of Energy and Mines (*Ministerio de Energía y Minas* - MEM), is the competent authority in environmental matters in the energy and mines sector.

3.2 The General Directorate of Hydrocarbons (*Dirección General de Hidrocarburos* - DGH), within the MEM, is responsible for the hydrocarbon sub-sector. The DGH is responsible for the implementation and fulfillment of the general hydrocarbon law and regulations, regarding the installation and operation activities for exploration and exploitation of surface and subsurface, storage, transportation and commercialization of hydrocarbons.

3.1.2 Environment

3.3 The MEM Directorate of Environmental Affairs (*Dirección General de Asuntos Ambientales* - DGAA) is responsible for regulating, promoting and advising on environmental matters in the energy sector and for evaluating and approving the Environmental Impact Assessment (EIA), and regulating the assessments of environmental and social impacts derived from energy sector activities. The DGAA is also responsible for establishing preventive and mitigation measures to control impacts and for evaluating incidents of non-compliance of sector regulations and proposing adequate and pertinent sanctions.

3.4 The Supervising Body for Investment in Energy, OSINERG (*Organismo Supervisor de la Inversión en Energía*) was established by Law Nº 26734 (96-12-31) as the entity responsible for monitoring the legal and technical aspects of hydrocarbon activities in Peru, as well as, compliance with legal and technical regulations governing the protection and conservation of the environment while developing hydrocarbon activities. OSINERG is an autonomous entity of the Ministry of Energy and Mines. General resolution S.D. Nº 054-2001-PCM, states that OSINERG has the authority to supervise, sanction and control entities (natural or legal persons performing activities related to the hydrocarbon sub sector) to assure the adequate conservation of the environment (Art. 1). All entities in the transportation, storage, distribution, refining, and commercialization of hydrocarbons must supply OSINERG with pertinent technical and economic information covering the activities being developed. OSINERG is the competent authority in imposing administrative sanctions in the case of non-compliance with national hydrocarbon requirements.

3.5 The National Environmental Council (*Consejo Nacional del Ambiente* - CONAM), created by Law Nº 26410 dated 94-12-22, is the body that oversees Peruvian environmental policy and is responsible among other functions for: establishing general criteria for the quality of the environment, coordinating the permissible limits for environmental protection, and establishing the general criteria for drawing up environmental impact studies.

3.6 In November 2002, based upon the institutional framework required for the IDB public sector loan for the institutional strengthening of the GOP for the Camisea Project, GOP created the *GTCI - Grupo Técnico de Coordinación Interinstitucional de Camisea* as the inter-institutional coordination agency for the Camisea Project. The GTCI comprises the following governmental agencies involved in the supervision and monitoring of the Camisea Project: MEM (DGAA and DGH), INRENA, OSINERG, National Institute of Culture (INC), INADE, General Direction of Environmental Health/Ministry of Health (DIGESA/MINSA),

Ministry of Agriculture, Land Titling Program (*PETT-Programa Especial de Titulación de Tierras*), *Comisión de Pueblos Andinos y Amazónicos*, *Defensoría del Pueblo*, CONAM, DICAPI/*Ministerio de Defensa*, and Ministry of Transportation (DGC/*Ministerio de Transporte*).

3.7 The specific objectives of the GTCI are to: (i) coordinate the supervision, monitoring and enforcement of environmental and social requirements for the Camisea Project that are performed by the different institutions that comprise the GTCI; and (ii) contribute to promote the integrated actions of the GTCI governmental institutions in the areas of influence of the Project. GTCI is also the executing agency for the IDB institutional strengthening public sector loan.

3.8 The Ministry of Agriculture (*Ministerio de Agricultura*) is the competent authority that establishes and enforces the conservation of natural resources (water, soil, flora, and fauna) through the Natural Institute of Natural Resources (*Instituto Nacional de Recursos Naturales* – INRENA). INRENA is the ultimate authority in charge of protected areas and natural resources management and is responsible for managing and controlling the rational and integral use of renewable natural resources and their surrounding environment. In accordance with S.D. Nº 056-97-PCM, INRENA is required to give a technical opinion before the approval of the EIA for any activities that modify the natural condition of renewable natural resources. Also, INRENA should, in the case of works to be developed inside protected areas, emit a favorable technical opinion before DGAA (MEM) can approve this work.

3.9 The Ministry of Health through its General Directorate of Environmental Health (*Dirección General de Salud Ambiental* - DIGESA), under the General Health Law (N°26842), is the competent authority that: enforces preventative and controlling measures to prevent environmental contamination, when this means a risk or hazard to human health; issues sanitary regulations that regulate the discharge of waste or contaminating substances in the water, air or soil; and regulations related to the qualification of hazardous substances and products, conditions and limits of toxicity and hazards, and other aspects required to control the risks and prevent the damages that these substances and products can cause to human health.

3.10 The General Coastguard and Port Directorate (*Dirección General de Capitanías y Guardacostas* – DICAPI) is the national marine authority that regulates, authorizes, and supervises activities in national navigable waters. DICAPI coordinates the National Contingency Plan that controls and prevents the contamination of marine resources and navigable continental waters from ships, ports, and the loading and unloading of hydrocarbons activities.

3.1.3 Health and Safety

3.11 The Ministry of Health through its General Directorate of Environmental Health (*Dirección General de Salud Ambiental* - DIGESA), under the General Health Law (N°26842), is the competent authority that enforces the necessary measures to minimize and control environmental health risks.

3.1.4 Indigenous Peoples

3.12 The Technical Secretariat of CONAPA (*Secretaría Técnica de CONAPA Ministerio de la Presidencia*) is responsible of promoting, coordinating, managing, supervising, and evaluating the policies, plans, programs, and projects for the development of rural and native communities, by also respecting their ethnic and cultural identity and their organization methods.

3.1.5 Cultural Issues

3.13 The National Institute of Culture (*Instituto Nacional de Cultura* – INC) is responsible for the preservation of cultural heritage. The INC authorizes whether or not a project can affect archeological sites. In coordination with the regional authorities, the INC is also responsible for the restoration and development of archeological sites.

3.2 Legal

3.2.1 Energy

3.14 The Hydrocarbon Law (*Ley Orgánica de Hidrocarburos*) No. 26221 dated August 20, 1993, is the basic regulation governing hydrocarbon activities in Peru. The law states that all necessary legal rights of way shall be established for natural gas exploration, exploitation, pipelines and distribution activities.

3.15 Accordingly, TGP and Pluspetrol developed a program to enable the identification of all affected people, families, and/or communities and established a negotiating mechanism providing for the appropriate understanding and agreement among the parties (Art. 79, E.D. N° 056-93—EM) without resorting to the participation of the country's law enforcement authorities or Appraisal Technical Team (Art. 85 E.D. N°056-93-EM). Article 87 of the law establishes that all hydrocarbon activities must protect the environment in accordance with the requirements stipulated in the Environmental Protection Regulations. In case of non-compliance, the MEM will determine the pertinent sanctions, including the termination of the respective contract.

3.16 The Regulations for the Transport of Hydrocarbons through Pipelines - S.D. Nº 041-99-EM (09-15-99), establishes the specific provisions concerning the granting of concessions for the transport of hydrocarbons, setting tariffs, safety regulations, environmental protection regulations, the competent authority, and monitoring. It establishes types of easements, requirements for requesting easements, the granting of easements, compensation to proprietors, the powers of the Ministry of Energy and Mines, rights inherent in easements, and the expiry thereof. The appendixes establish the safety regulations for the transport of hydrocarbons through pipelines, covering the design, construction, operation and maintenance, and abandonment of transport systems, as well as for the protection of personnel, the public, and the transport system.

3.17 The Safety Regulations for the Transport of Hydrocarbons - S.D. Nº 026-94-EM (05-10-94), contain the safety regulations for the transport of hydrocarbons by road, water and air. Therefore, concessionaires must submit to OSINERG a safety manual for the transport system and a contingency plan, with which their employees must be familiar.

3.2.2 Environmental

3.18 The Environment and Natural Resources Code – D.L. N°613 - establishes the general norms relative to the protection and conservation of the environment and its resources. Article 73 of the Code also states that the exploitation of energy, its infrastructure, transport, transformation, distribution, storage and final use must be carried out without contaminating the soil, water or air. Per Article 9, the EIA must include a description of the activity along with the direct and indirect impacts environmental and social impacts foreseen in the short to long-term.

3.19 The Environmental Protection Regulations (*Reglamento para la Protección Ambiental*) in the Hydrocarbon Sector given by Supreme Decree No 046-93-EM dated November 12, 1993, establishes the requirements that shall be taken for the construction of gas pipelines. Article 46 establishes specific norms for the transportation and storage of hydrocarbons.

3.20 The Forestry and Woodland Fauna Act – Law N° 27308 (2000-07-16), is intended to regulate and monitor the sustainable use and conservation of Peru's forest resources and woodland fauna, making the use of such resources compatible with the progressive valuation of forest environmental services in harmony with the social, economic and environmental interests of the nation. It establishes that the holders of contracts for petroleum operations that operate within forests or forest areas require authorization from INRENA to clear such areas, in accordance with the provisions of its regulations (Article 17).

3.21 The Water Resources Act and the Water Code regulates the use and quality of this resource. These legal documents state that no one may alter the regime, nature or quality of water without the corresponding authorization and under no circumstances if this prejudices public health or natural resources. The use of water (whether for generating energy or for industrial or mining uses, etc.) is granted through permits, authorizations, and licenses. For the use of surface water, in accordance with Article 120 of S.D. N° 0048-91-AG (which approves the rules for the Agricultural Sector Investment Promotion Act), an authorization must be issued by the Technical Manager of the Irrigation District. For the discharge of treated water, the Water Resources Act establishes that authorization must be issued by the General Direction of Environmental Health (*Dirección General de Salud Ambiental* – DIGESA).

3.22 The Natural Protected Areas Law (*Ley de Áreas Naturales Protegidas*) N°. 26834 dated July 4, 1997, defines Natural Protected Areas (*Áreas Naturales Protegidas* - ANP) on land or at sea that have been recognized and declared as such and are intended for the conservation of biological diversity and other cultural, landscape and scientific values, as well as contributions to the sustainable development of the country (Article 1).

3.23 The Supreme Decree N° 1281-75-AG of 25 September 1975 created the Paracas National Reserve, encompassing 827,450 acres (335,000 hectares) of Peru's southern Pacific coast, 166 miles (265 kilometers) south of the capital city of Lima. Paracas is the only protected coastal-marine system in Peru and one of the most biologically productive marine areas in the world, serving as a major food source for fish, birds and marine mammals. The reserve also contains nearly 100 archeological sites. The Paracas National Reserve Master Plan was approved in December 1980 and revised in March 1996. The Master Plan defines seven different categories of zones within the Reserve plus the Reserve's buffer zone. A number of

restrictions to tourism and commercial activities are established for the seven zones within the Reserve, but none for the buffer zone. The buffer zone for the Paracas National Reserve is limited to the North by the south margin of the Pisco River, to the East by the Panamericana Sur Road (Santa Cruz), to the West by the Pacific Ocean and to the South by the locality Punta Lomitas.

3.2.3 Indigenous Peoples and Cultural Resources

3.24 The Native Communities Law (*Ley de Comunidades Nativas*) D. Leg. No. 22175 and its regulatory requirements approved by Executive Decree No. 002-79-AA, establishes the agricultural structure of the rainforest and highland rainforest regions and the land tenure system for the integral development of these regions and its habitants. The law also acknowledges ancestral rights over areas currently occupied by the communities.

3.25 The International Labor Organization (ILO) Convention 169 concerning Indigenous and Tribal Peoples in Independent Countries, ratified by the Congress of Peru on January 17, 1994 by Resolution N° 26253, establishes that the indigenous peoples shall participate in the formulation, implementation and evaluation of plans and programs for national and regional development which may affect them directly. The Convention states that in cases in which the State retains the ownership of mineral or sub-surface resources or rights to other resources pertaining to lands, governments shall establish or maintain procedures through which they shall consult these peoples, with a view to ascertaining whether and to what degree their interests would be prejudiced, before undertaking or permitting any programs for the exploration or exploitation of such resources pertaining to their lands. The peoples concerned shall wherever possible participate in the benefits of such activities, and shall receive fair compensation for any damages which they may sustain as a result of such activities."

3.26 The General Law for the Protection of the Nation's Cultural Heritage (*Ley General de Amparo al Patrimonio Cultural de la Nación*) N° 24047 (01-05-85), amended by laws N° 24193 (06-06-85), and N° 25666 (06-27-92) protects and recognizes as cultural heritage archeological and/or historical sites. Pursuant to Archeological Investigation Regulations (*Reglamento de Investigaciones Arqueológicas*) created by S.R. N° 004-2000-ED (01-24-2000), TGP is required to obtain a Certificate of Absence of Archeological Remains (*Certificado de Inexistencia de Restos Arqueológicos* – CIRA) from the Institute of National Culture. The CIRA requires an Archeological Evaluation Report containing the results of fieldwork conducted within the gas pipeline corridor and adjacent areas used by the project.

3.2.4 Health and Safety

3.27 The General Health Act Law N° 26842 (20-07-97) establishes that it is in the public interest to protect health as a fundamental right. Article 35 of the Hydrocarbon Law (No. 26221) establishes that the consortium shall protect and secure the workers' health during the construction and operation of the pipelines. It also establishes that hydrocarbon activities shall be performed according to generally accepted international hydrocarbon industrial safety procedures.

3.2.5 The EIA Process

3.28 The environmental licensing process for hydrocarbon sector projects developed in Peru consists of, under S.D. N° 046-93-EM (93-11-12) of the Regulation for the Protection of the Environment during Hydrocarbon Activities, modified by the S.D. N° 09-95-EM (95-05-13), the submission of an environmental impact study (EIS or EIA) or a preliminary environmental impact study (PEIS) by a qualified company under the Bureau of Environmental Affairs of the Ministry of Energy and Mines, prior to the beginning or extension of hydrocarbon activities.

3.29 Supreme Decree Nº 003-2000-EM states that all environmental impact studies referred to in Article 10 of the Regulation for the Protection of the Environment during Hydrocarbons Activities - S.D. Nº 064-93-EM, must include a social impact assessment (SIA) and defines the content of the SIA: a socio-economic base line, potential impacts on social, economic, and health aspects that may affect native or rural communities within the project area and the measures to be adopted to prevent, minimize or eliminate these impacts.

3.30 Supreme Decree N° 053-99-EM establishes a "positive administrative silence" if the DGAA has not reached a pronouncement regarding the EIA and SIA subsequent to 90 calendar days since their presentation. In accordance with S.D. N° 056-97-PCM, INRENA is required to give a technical opinion before approval of the EIA for any activities that modify the natural condition of renewable natural resources such as water, soil, flora and fauna. S.D. N° 061-97-PCM gives INRENA a period of 20 business days in which to issue its technical opinion, understanding that silence on the part of the authorities is taken to be positive. Additionally, because the right-of-way crosses part of the Apurímac Reserved Zone (ZRA), the project requires authorization to enter that zone.

3.31 Ministerial Resolution N°728-99-EM/VMM, published 1999-12-30, approved the Regulation Governing Citizens Participation in the Approval Process for Environmental Studies submitted to the Ministry of Energy and Mines. This regulation was also taken into account in the elaboration process of the EIA. Ministerial Resolution N° 596-2002-EM/DM, published 2003-12-20, approve the Regulation of Consultation and Civic Participation in the Procedure of Approval of the EIAs contributing significant changes to the regulation approved in the ministerial resolution N° 728-99-EM/VMM. These changes require workshops with stakeholders prior to EIA submittal, increase of the advance notice time of the public hearing, increase the review period so that the public can present their observations after the public hearing, and establishes new requirements to carry out the public hearing.

3.32 DGAA Ministerial Resolution 010-2001-EM/DGAA has approved a Community Relations Guide, which establishes the content, requirements and framework for consultation with the project stakeholders. The Guide also refers to the issue of corporate social responsibility, a requirement that must be developed and implemented by the project companies.

3.3 Other Requirements

3.33 In addition to meeting the applicable Peruvian environmental requirements indicated above, the Upstream and Downstream Components have stated that they would comply with other more stringent standards, including those in the World Bank Pollution Prevention and Abatement Handbook (July 1998).

3.34 Tables 3-1 to 3-5 provide a list of air, water and noise standards for the Camisea Project.

3.4 Project Compliance Status

3.4.1 Environmental Impact Assessment and Approvals

3.35 Prior to initiating construction, all three components of the Camisea Project prepared and disclosed a specific Environmental Impact Assessment (EIA), which included a Social Environmental Assessment[5] and an Environmental and Social Management Plan.

3.36 Two principal EIAs were developed and approved for the Upstream component: one for the gas exploration and associated facilities in Block 88, and one for the Fractionation Plant and marine terminal in Pisco. The EIA for the gas exploration and associated activities in Block 88 and at Las Malvinas was submitted on August 17, 2001, following extensive consultation with local communities (see Section 7 for details on public consultation activities conducted as part of the EIA and subsequently). Subsequent to the EIA being available to the public, three public hearings were held. MEM issued the approval of the EIA on December 17, 2001. An additional EIA was developed for building of docks in Las Malvinas and was approved in August 2001.

3.37 The EIA for the Fractionation Plant and Marine Terminal in Playa Lobería (Pisco) was submitted on August 1, 2002. Based on the review of this study, IDB recommended the development of an expanded more complete alternative analysis and a public consultation process. On November 8, an alternative site analysis was submitted. This document supported the selection of the Pisco site among 14 others that were studied (see Section 2.7 for details). Upon observations received from INRENA, DGAA, IDB and other stakeholders, modifications were made to the original design, substituting the proposed berth for a submarine pipe. A revised EIA, addressing the comments made by INRENA to the alternative site analysis and incorporating the new submarine pipe was re-submitted on November 19, 2002. Fourteen consultation meetings were held between September 2002 and January 2003, (in addition to the 10 previously held, including three as part of the IDB public consultation process held in August 2002) where the site location was specifically discussed. Additionally, GOP held two public hearings in Ica on January 27 and 28, 2003. Pluspetrol held another fourteen additional consultation meetings between February and April 2003 (See Section 7 for details on all public consultation activities). On March 28, 2003, Pluspetrol requested that the EIA be approved in two separate stages - one for the fractionation plant and the other for the marine terminal. The rationale was that although both components are intrinsically integrated during operations, during construction each would affect different ecosystems and require studies of different natures. MEM/DGAA agreed that the information provided by Pluspetrol in relation to the terrestrial ecosystems to be affected by the fractionation plant was sufficient to grant the approval of the EIA and the environmental permit for this component only, whereas more information was required in regard to the marine ecosystems and the submarine pipe and loading facilities (altogether known as marine terminal). On April 2, 2003 INRENA approved the proposed site, subject to the subsequent presentation of additional studies. On April 4, MEM/DGAA issued the conditioned Permit (*Resolución Directoral* 173-2003-EM/DGAA), approving the on-shore facilities (Fractionation plant) but conditioning the

[5] A participatory rural appraisal methodology was used for the Social Impact Assessment.

approval of the marine terminal facilities to the subsequent presentation of a number of additional studies.

3.38 Among the additional studies that were required and have been submitted are: mathematical modeling of currents and sediment dispersion due to dredging and spills of liquid during loading operations; mitigation measures for marine installations; procedures for chemical substances management; landscape study for the area surrounding the fractionation plant to mitigate the visual impacts; study for the extraction of underground water and the corresponding mitigation measures; proposed technology and construction strategy as to mitigate the negative impacts of the construction of the submarine pipe and ensure the protection of the marine environment; a detailed cartography of the area of influence of the fractionation plant; an updated oceanographic study focusing on marine currents and waves in the area; an ecological study addressing the marine ecosystem, the seabed ecosystem, the costal-marine wetlands' ecosystem, and the endemic and migratory birds ecosystems. In addition, prior to starting operations Pluspetrol must present to MEM/DGAA the detailed Contingency Plan for operations, which must include the detailed navigation routes of the vessels that will use the loading facilities; and a study of the direct and indirect induced impacts of the project (including both the fractionation plant and the marine terminal).

3.39 In addition, MEM/DGAA requested: (i) an environmental insurance (or equivalent financial instrument) to ensure prompt rehabilitation of any negative impact on the ecological diversity and physical integrity of the Paracas National Reserve and its buffer zone, including impacts to third parties; and (ii) compliance with all the corporate commitments signed with INRENA by Pluspetrol, including Pluspetrol's transfer to INRENA the use of the 216 ha of land adjacent to the fractionation plant that will not be occupied by the industrial facility.

3.40 The EIA for the Downstream component was developed using a participatory rural appraisal methodology for the Social Impact Assessment and was submitted on September 24, 2001 (see Section 7 for details on all public consultation activities prior to and subsequent of the EIA). Following four public hearings, MEM issued the approval on March 18, 2002. In addition to the main route and corresponding EIA, four alternative routings at selected sites were studied and the corresponding EIAs were developed and approved:

(i) Aendoshiari Alternative, proposed to avoid a Native Community and minimize impacts on un-impacted forests, is approximately 15 km long and was approved on July 23, 2003;
(ii) Pacobamba Alternative, approximately 36.8 km-long through secondary forest and rural communities, was designed to avoid the primary forests between km 156+178 and 192+225 in the Chunchubamba river watershed, approved December 3, 2002;
(iii) Pisco River Alternative, designed to minimize construction impact, is 52.73 km long and was approved on December 12, 2002; and
(iv) Cañete Alternative, designed to avoid a complex drainage system built by the Ministry of Agriculture, is 19.5 km long and was approved on April 14, 2003.

3.41 Five additional EIAs were developed and approved for specific infra-structure components:

(i) An EIA for the construction of two loading docks located on the right banks of the Urubamba River;
(ii) An EIA for the worker camps;

(iii) An EIA for the transportation of equipment along the Paratori segment and the improvement of the Alto Itariato access road;
(iv) An EIA: "Obras-Complementarias"; and
(v) An EIA: "Cruce Aereo Río Comerciato"

3.42 Additionally, an EIA for the deviation towards Playa Lobería was submitted in April 2003 and is still awaiting approval.

3.43 The EIA for the Distribution component also includes a social impact assessment, and was approved in July 2002. Subsequently, two alternative routes and corresponding EIAs were developed. The first route was approved in November 2002 and avoids the historic areas of the center of Lima and the Pachacamac sanctuary; the second route, still under review by the MEM, avoids crossing Ventanilla district, where uncontrolled settlements have developed, thus avoiding the social impacts associated with that crossing (construction has not started in this section yet).

3.4.2 Permits and Authorizations

3.44 A list of Permits and authorizations obtained for the development of the Camisea Project are listed in Tables 3-6 and 3-7.

4.0 ENVIRONMENTAL AND SOCIAL CONDITIONS

4.1 This chapter presents an overview of the main environmental and social conditions present in the direct and indirect area of influence of the Camisea Project. The definition of the direct and indirect areas of influence of the Project during construction activities vary according to the geographic location of each Component, as defined below.

4.2 The direct area of influence for the Upstream Component facilities in Block 88 and Las Malvinas will include the immediate areas around the four platforms (San Martín 1 and 3 and Cashiriari 1 and 3), the seismic lines, the area around each of the 66 helipads, and the flowline right-of-way (ROW) corridor between the wells and the Las Malvinas Plant; and the facilities at Las Malvinas (compression plant, pump station 1, an airfield, and dock). For the fractionation plant and the marine terminal in Playa Lobería (Pisco), the direct area of influence will be the immediate urban, coastal, and marine area adjacent to the facilities. The direct area of influence for the construction of the submarine pipeline was defined as an area up to 1,000 m from each side of the pipeline and from its end at the loading/unloading facility. The indirect area involves all the adjacent area in the Paracas Bay.

4.3 The indirect area of influence of the Upstream Component extends to areas of the Lower and Upper Urubamba River, and Camisea River watersheds in the rainforest sector. This includes areas of contacted native communities located in the Lower Urubamba River (downstream from Nuevo Mundo towards Bufeo Pozo and Nueva Unión), and the lands reserved by the state in benefit of the Nahua-Kugapakori.

4.4 During construction of the pipeline and associated facilities (Downstream Component), the direct area of influence is within the 3-kilometer corridor of the pipeline route. The actual pipeline ROW (20 to 25 meters on average) has been cleared, and the pipes set in a trench.

The supporting equipment staging areas, worker camp facilities, and other infrastructure associated with the pipeline construction are limited to this corridor. The indirect area of influence extends to remote areas of the Lower and Upper Urubamba River and the Machiguenga Communal Reserve (MCR), and native and non-native communities in the Upper Urubamba River. The indirect area of influence in the highland and coastal sectors are not as extensive as in the rainforest sector and will be limited to the peasant communities and urban areas closer to the ROW, because of their state of development.

4.5 Finally, for the Distribution component, the direct area of influence was estimated as a 100-meter corridor along the pipeline network (50 meters at each side of the pipe). The area of indirect influence was estimated as encompassing all neighborhoods of Lima and Callao that will be crossed by the gas distribution network.

4.1 Environmental

4.6 The Camisea Project extends over a large and sensitive area of considerable variety in terms of geography, climate, flora and fauna, as well as of socio-cultural and economic backgrounds. The direct and indirect area of influence of the Project includes three main ecosystems: (i) the Lower and Upper Urubamba region of the Peruvian Amazon *(*rainforest), (ii) the low and high valleys of the Andean Mountainous range (highlands), and (iii) the rural and urban low-lying desert areas of the coastal segment (coast).

4.7 The Upstream Component comprises the San Martín and Cashiriari gas fields in Block 88 and the fractionation plant and marine terminal, located in the buffer zone of the Paracas National Reserve in the Province of Pisco. The area of the gas reserves (Block 88) is located in the rainforest of the Lower Urubamba valley in the Amazon Basin, 430 km east of Peru´s capital Lima, between the internationally recognized Manu National Park to the northeast and the former Apurímac Reserved Zone (ZRA) to the southwest. It is recognized as one of the most important global biodiversity "hotspots" because of its biological richness, high number of endemic species and the presence of threatened species.

4.8 The pipelines of the Downstream Component extend over the three ecosystems described above. Each span of the pipeline right-of-way (ROW) is defined by kilometer post (kp) as follows:

- The *rainforest* span of the ROW begins on the banks of the Lower Urubamba River at the Las Malvinas Plant (Upstream Component) in the District of Echarate, of the southeastern rainforest region of northern Cusco (kp 0 to kp 182).
- The *highlands* span of the ROW crosses over the Andean mountain range for a distance of 273 kilometers through the Departments of Ayacucho and Huancavelica. This span reaches elevations of almost 5,000 masl (meters above sea level) and covers from kp 182 to kp 455.
- The *coastal* span begins on the western flank of the Andes at approximately 2,000 masl and traverses desert topography through the Departments of Ica and Lima. The NGL pipeline will run for approximately 95 km to the fractionation plant and marine terminal (kp 455 to kp 550), which are proposed to be located near Pisco in the buffer zone of the Paracas National Reserve. The NG pipeline route will run north through arid and semiarid coastal desert across dry and irrigated farmlands parallel to the coast until reaching the City Gate in Lima (kp 550 to kp 715).

4.9 The Distribution Component extends from the City Gate in the District of Lurín (where the pipeline of the Downstream Component ends) for 62 km through urban coastal areas, to the Ventanilla District, north of the city of Lima.

4.1.1 Rainforest

4.10 Of the entire Camisea Project, the two gas fields (Block 88) and 27% of the pipeline ROW are located within the rainforest. The rainforest is the largest area of land in terms of natural ecosystems and land use in Peru.

4.11 *Climate.* In general, the climate of the Peruvian rainforest is tropical with high temperatures all year round, reaching maximums of 35° C. Rainfall is divided into two distinct seasons: a dry season from April to November and a rainy season from December to March, approximately. Within the rainforest, climatic characteristics vary as described below.

- Lower rainforest climate. The Lower Urubamba, from Kirigueti to el Pongo de Mainique, is characterized by its low altitude (less than 500 to 600 masl), and has an average annual temperature of about 24.5° C. Rainfall is in the range of 2,000 to 3,000 mm a year.
- Upper rainforest climate is found above 500 to 600 masl and extends to between 2,200 to 2,500 masl. Air masses from the Atlantic reach the low rainforest and are forced upwards into the upper rainforest by the presence of the Andes. This ascent cools the air[6] causing high condensation, cloud formation and subsequent heavy rain. The high rainforest (above 1,800 masl) is the region of Peru that receives the highest levels of precipitation, exceeding 4,000 mm. The production and the area through which the flowlines will pass (between the platforms and Las Malvinas) have a tropical upper rainforest climate.
- Highland rainforest climate is found above an altitude of 2,200 to 2,500 masl and is characterized as a strip of rainforest on the Andean mountain range. This area, known as the rainforest boundary, forms the upper limit of the Amazon rainforest and is also the upper limit of the high rainforest rainfall. The lower temperatures of the rainforest boundary – also known as "cloud forest" – cause the climate to be milder than in the upper rainforest. Although no meteorological records exist for this area, rainfall is estimated to be similar or slightly less than that of the upper rainforest (4,000 mm a year or less). The rainforest boundary rises to 3,200 to 3,600 masl, and temperatures are estimated at 10° C lower than in the low rainforest.

4.12 The prevailing winds throughout the year are generally calm (2.0 ms^{-1}) and predominantly from the Southeast, South and East. However, towards the end of the year, the winds of the South known as "surazos" can cause local temperatures to drop between 10 and 15° C. They are caused by waves of cold air preceding the anticyclone of the South Atlantic, which notoriously influence daily absolute minimum temperatures and can reach speeds of up to 14 ms^{-1}.

4.13 *Air Quality and Noise Levels*. Air quality in the rainforest has largely been unaffected by anthropogenic degradation because until recently, difficult access to these remote forest areas

[6] The high areas near the tributaries of the Urubamba River have temperature drops to -14° C.

has protected it from colonization. Nonetheless, baseline conditions were established for the EIA through a sampling and analysis process.

4.14 For the Upstream component, air samples were taken from nine points located in different areas of Block 88 along the corridor considered for development as part of the Upstream Component (Las Malvinas (2), San Martín 1, San Martín 3, Cashiriari 1, Cashiriari 3, Camisea, Segakiato, Chocoriari and Marankiato). The objective of the air samples was to determine a baseline of basic parameters before the construction and operations. Air samples were tested for CO, NO_x SO_2, hydrocarbons and volatile organic compounds (VOCs) at 1.5 m above ground level. The results of the analyzed samples were below national air quality standards.

4.15 For the Downstream component, air quality and noise monitoring points were installed along the pipeline corridor. Five air quality and twelve noise monitoring stations were located on the basis of the future location of the pumping stations, logistic campsites, and semi-populated areas near construction and operation activities (Las Malvinas, Alto Shimaa, Kepashiato, Villa Quintiarina and Kiteni in Cusco). Air quality analysis results obtained were below the limits of national air quality standards. Noise levels tested slightly above limits established by the World Health Organization (WHO) for daytime hours. The main sources of noise in the region come from the local fauna.

4.16 *Geology and Geomorphology*. The area traversed by the Downstream Component in the rainforest span has three major structural elements: (i) the western Andean mountain range, characterized by a very irregular and rough mountainous relief; (ii) the sub-Andean strip, characterized by a lower topography consisting of an alignment of hills that belong to the western Andean spurs; and (iii) the Amazonian plains formed by a depressed and softly rolling topography. Block 88 and the flowline areas are characterized by a deep bedrock formation (1,000 to 1,500 m in the area of the flowlines and over 1,500 m in Block 88). The geologic formations in the region are predominantly sandy or clayey, deposited during the Neoproterozoic period, affected by several tectonic events. The region is one of moderate seismic risk. The plains are stable areas of medium to high terraces with little risk of flooding.

4.17 The Downstream Component crosses diverse terrains and landscapes: 3.3% of the pipeline route crosses through gentles slopes in highly stable areas; 20.3% of the route crosses moderately stable to potentially unstable areas with a low possibility for geodynamic movement; 30% of the route crosses unstable areas suffering from different levels of environmental deterioration including physical risk; and 46.7% of the route crosses through areas of the rainforest considered to be highly unstable due to the rugged terrain and irregular rock strata.

4.18 *Soils*. Soils in the rainforest region are of alluvial origin and vary in composition according to their age and flooding levels. The grain sizes vary from coarse sand in the mountainous soils to silty clay in the high alluvium. Soil development ranges from scarce, in the case of the more recent floodable soils, to a marked differentiation process in older alluvial terrace soils. Mountain soils are generally shallow to superficial where the slope increases. The moderately-steep to steep slopes have high hydraulic erosive potential and low fertility due to deficient levels of principal nutrients as well as high content aluminum. The warm climate and abundant precipitation in the region lead to strong weathering of the upper layers of the soil increasing their susceptibility to erosion and subsequent soil instability when left bare.

4.19 *Land Use*. Along the pipeline route in the rainforest region, 35% of the total length is moderately to severely affected by human activity. Considerable deforestation has taken place mainly on the banks of the Apurímac River and to a lesser extent the banks of the Mantálo, Urubamba, and Poyentimari Rivers. Naturally, deforestation has accelerated the erosion process.

4.20 Native indigenous communities and rural settlers use the banks of the Urubamba River and the junctions of the Cashiriari and Camisea Rivers for small-tract farming, cattle breeding and small-scale subsistence farming using the method of slash and burn, primarily along the river valleys and flood plains of the Urubamba and affluent Rivers. Colonists or rural settlers practice migratory agriculture over large extensions of land, reducing reforestation possibilities and speeding up land erosion. Many native and nomadic communities living in isolation in the Lower Urubamba region use the land for subsistence hunting. This region also suffers the impacts of unsustainable land use brought on by illegal loggers and of coca plantations.

4.21 *Hydrology*. The direct area of influence of the Upstream and beginning of the Downstream Components is hydrographically located in the Basin of the Urubamba River (Lower Urubamba) that forms part of the Basin of the Ucayali River, which in turn is integrated into the Amazonic hydrographic system. Block 88 has an area of 1,435 km^2 covering most of the Camisea River basin, and part of the Paquiria and Mishaua River headwaters, and tributaries of the Urubamba River. The large rivers of the project area of influence, the Urubamba, Apurímac and Camisea, have a flow rate of several thousand cubic meters of water per second, particularly during the rainy season. The flow rates decrease to just a few hundred m^3/sec during the dry season. The rivers in the rainforest are navigable and play a crucial role in the logistics of both the Upstream and Downstream Components of the Project during each rainy season.

4.22 *Water Quality*. Water samples were collected and analyzed as part of establishing an environmental baseline within the EIA process. For the Upstream, a total of seventeen sampling points were tested periodically in the different watersheds mentioned above of the Lower Urubamba. Samples were tested for pH, electrical conductivity, anions, cations, heavy metals, total and fecal coliforms, and total petroleum hydrocarbons (TPH). Physical and chemical parameters were found to be within the maximum allowable limits established by the General Water Law for Class VI Waters and those established by the United States Environmental Protection Agency (USEPA). For Downstream, TGP selected twenty sampling points along the Apurímac and Urubamba watersheds of the Lower and Upper Urubamba, where most impacts are expected to occur from the installation of the pipeline. Physical and chemical parameters for these sampling points fell within the maximum allowable limits established by the General Water Law for Class VI Waters and those established by the United States Environmental Protection Agency (USEPA) except for oils and grease originated by natural oils and tannin existing in the area.

4.23 *Flora*. Recent studies in lowland rain forest areas of the Urubamba Basin demonstrate the important biological diversity of the region, recognized as one of the most biologically diverse forests on the planet. Conservationists regard the Lower Urubamba region and adjacent Cordillera Vilcabamba as a globally important conservation "hotspot" because of the high diversity of biological species (both flora and fauna) present and the high incidence of endemism (presence of species that occur no where else in the world) and the presence of endangered species.

4.24 Ecological conditions for the Camisea Upstream Component vary by location. The forests in Block 88 are located in a mountain, hill, and terrace landscape physiography that ranges in elevations of 500 m to over 1,000 m with numerous gorges. The Camisea and Cashiriari Rivers cross Block 88 in a general east-to-west direction. Both streams support diverse fish populations and healthy freshwater ecosystems and are surrounded by forest . Conditions along the Urubamba River west of Block 88, where the Las Malvinas camp, dock, plant, gravel quarries, and airstrip are located have previously been affected by agricultural development. Much of the forest has been cleared, and existing forest is largely secondary growth, although many parts along the banks of the Urubamba River still remain as intact forest. A small island in the Urubamba River, across from the Las Malvinas camp supports a small stand of trees important for birds because of its isolation from terrestrial predators.

4.25 Studies in the upper Amazon Basin of the project region, including lowland rainforest near Camisea, indicate the importance of certain keystone species in the survival of a variety of other species because of seasonal changes in food availability. This regionally relevant example illustrates the connection between biological diversity and overall ecosystem structure and function (i.e., ecosystem health and sustainability) that is relevant in sustaining the ecosystems and their indigenous inhabitants.

4.26 The predominant type of vegetation in the area of influence of the Project is primary forest and secondary forest, and to a smaller extent crop plantations (coffee, orange, cocoa, etc.). Of the 182 km of pipeline route that crosses the rainforest into the highlands, 50 km of it traverses through primary or nearly intact forest. The baseline study indicates that the low-lying tropical forest and the mountain forest contain the largest number of species by 30% and 27%, respectively, with few families dominating nearly 50% of total vegetation within the 17 units identified along the project area of influence. These areas vary according to altitude and level of conservation. The flora composition of the forests is heterogeneous with the particular presence of the bamboo *Guadua sarcocarpa* that is found in very diverse densities, sometimes dominating the landscape. Palm trees are also important components of the forests, the *Iriartea deltoidea* among the most representative.

4.27 *Fauna*. The area as a whole revealed a high diversity in all groups of vertebrates. Birds are the most abundant wildlife species (370) many endemic to the Amazon rainforest below an altitude of 600 m. Preservation of bird habitats for bird species is a high priority for conservationists. A total of 78 species of mammals were recorded during the survey. The greatest diversity of species is located in the tropical rain forest below 800 m. Diversity depends on factors such as habitat alteration or direct impact on fauna. Of the 35 species of reptiles and amphibians identified in the rainforest, 15 are protected by CITES and Peruvian Laws. The largest predators like the jaguar were observed within Block 88 at most areas studied. There are at least 45 species of economic interest in the Lower Urubamba rainforest that are captured by natives for consumption, manufacture of handcrafts or for sale to the market economy.

4.28 The presence of some mammal species associated to aquatic media such as the otter and the giant river otter, indicate a good state of conservation and a low disturbance of these environments. 54 plankton species were registered, 45 of which are phytoplankton and 9 zooplankton. The Chlorophyta taxonomic division is the most diverse group with 20 recorded species. There are at least 35 species of benthic macroinvertebrates and 44 species of fish,

mostly detected in the Urubamba River. 35 of these fish species are important for consumption among the local native indigenous populations.

4.29 *National Parks and Protected Areas*. In the Upstream area, there is an area of land some 44,438 km^2 that has been reserved by the state for the benefit of the nomadic groups Nahua and Kugapakori. An area 1,200 km^2 of the eastern portion of Block 88 falls within these lands, occupying roughly 3% of the total reserved area.

4.30 In the Downstream area, 12 km of the pipeline right-of-way (Downstream Component) traverses the eastern edge of the Machiguenga and Ashaninka Communal Reserve in the Departments of Junin and Cusco. This Communal Reserve (total area of 709,347 ha) located within the former Apurímac Reserve Zone (ZRA) had enjoyed "protected" status for the last 15 years, but on January 15, 2003 the Machiguenga and Ashaninka Communal Reserves and the Otishi National Park were created by Supreme Decree Nº 003-2003-AG with a combined area of 1,669,300 hectares. The elevation to "reserved" status of the Communal Reserves came as a result of the recommendations made by the IDB as part of the environmental and social due-diligence of the Camisea Project and as a condition to disbursement of the Public Sector Loan that was granted by the IDB to the Government of Peru in December of 2003. The protected status of the communal reserves and Otishi National Park will help protect the region against uncontrolled colonization and undesired activities that threaten the physical and cultural integrity of the ecosystems and communities living.

4.1.2 Highlands

4.31 The pipeline ROW that crosses the valleys of the highlands constitutes 40.65% of the total pipeline route. Brief descriptions of the environmental characteristics of the direct and indirect area of influence of the pipeline in the highlands segment are identified below.

4.32 *Climate and Meteorology*. The climates of the highlands segment of the ROW are: 1) a cold and humid climate of the High Andes at over 3,800 m with annual rainfall of 600 mm to more than 1,000 mm, and average temperatures ranging from 4 to 10°C; 2) the mid-Andean climate found between 2,600 m and 3,800 m above sea level with annual rainfall of 500 to 800 mm and annual temperatures that range from 11 to 17º C; 3) the lower Andean climate is found below 2,600 to 2,800 masl with annual rainfall ranging between 500 mm in humid areas and less than 50 mm near the coastal desert. The climate of the upper Andean region, through which most of the pipeline in this segment will be routed, has above freezing temperatures. Construction in the highlands will take place all year round during both rainy and dry seasons and mud slides and landslides are considered to be a risk in areas of medium to high altitude with steep slopes and heavy rainfall.

4.33 *Air quality and Noise*. Air quality monitoring stations were located at two locations as part of the EIA baseline studies: 1) in the area of Vinchos ; and in 2) the Torobamba area of Ayacucho. Particulate matter (PM_{10}) and gas (CO, SO_2, hydrocarbons and NO_x) levels were tested periodically to monitor the air quality in the region. A total of eight monitoring stations were installed in urban areas along the highlands to monitor noise levels (Rangracuna, Torobamba, Curiyuna, Vinchos, Palmito, Rio Seco, Quito Arma and Challhuamayo). The average noise levels were between 45 and 60 dB. Both air and noise monitoring results indicate that the parameters tested are below the standards published in DS 074-01-PCM and

those suggested by international agencies such as the U.S. Environmental Protection Agency (USEPA) and the World Health Organization (WHO).

4.34 *Geology*. The pipeline of the Downstream Component crosses important morpho-structural units: (i) the upper Andean mountain range that is characterized by a prevalence of slightly or moderately rolling plateaus that alternate with rocky blocks to the west (facing Ayacucho) while more complex and rugged in the upper Andean slopes of the east, facing the rainforest; (ii) the inter-Andean valleys that occupy depressions, characterized by a mild sub horizontal topography; and (iii) the lower Andean mountain range characterized by arid to semiarid slopes, with a somewhat rugged relief. Seismic activity is common along the Andean relief because of the interaction between the Nazca plate and the South American plate. The rugged terrain and steep slopes of the highlands will complicate construction of the pipeline and will require some use of explosives. However, construction will be facilitated by the fact that materials are easily obtainable in riverbeds, moraines or colluvial deposits and rocky areas of the highlands.

4.35 The pipelines' ROW crosses through areas of varying degree of stability and physical risk:

- 22.7% of the pipeline route extends through stable areas of the Andes where gradients are generally gentle with an effective vegetative cover and where rainfall does not cause severe erosion. Operations in these areas will be relatively easy to carry out with preventative measures that diminish the risk of impacts on both the natural and social environments. These areas are widely distributed in the mid-Andean region and especially throughout the high Andean wetlands consisting of saturated soils formed where water runoff concentrates or underground water emerges onto the surface and are of special ecological importance for the hydrological regime.
- 34.8% of the length of the pipelines crosses slightly unstable areas mostly found on the Andean plateau and to a lesser extent in the mid-Andean valleys. These areas do not have geodynamic potential and are not considered to pose any risks to construction activities.
- 35.6% of the pipeline route crosses through areas considered to be unstable due to erosive process that have deteriorated the environment and rugged mountainous areas with complex geology representing a risk to the safety of the project.
- 6.9% of the pipeline route runs through highly unstable areas due to their instability and the existence of severe erosion and environmental deterioration, especially on the slopes of the Torobamba River valley.

4.36 *Soils*. There are four main types of soils in the highlands: 1) hydromorphic soils found in floodplains in upper Andean depressions; 2) upper Andean mineral soils with good internal drainage surrounding geologic depressions with varying degrees of depth, pH, structure, texture and other characteristics; 3) mid-Andean mineral soils with good internal drainage consisting of colluvial materials and slopes with moderate to steep gradients. These are generally cultivated in an inappropriate manner and are severely deteriorated by erosion; and 4) lower-Andean mineral soils with a course grain texture and excessive drainage that develop on steeply sloped unstable colluvial formations and a considerable distribution of pure rock formations, unsuitable for agriculture, livestock or forestry.

4.37 *Land Use*. The highlands segment of the pipeline route lacks high population density, urban/industrial development, traffic volume and major land use, and point and non-point

pollutant sources and is only accessible through the Libertadores highway, (a two-lane paved road that reaches the coastal zone). Only a small amount of land is suitable for intensive agriculture because of the severe limitations imposed by steep gradients . Areas suitable for intensive cultivation are locally eroded areas and valley floors of the mid-Andean valleys. The slopes between the middle and high Andean areas are suitable for forestry, where most agricultural activity and most of the villages and larger towns are situated. The higher lands are used extensively for livestock, mainly sheep, and indigenous species of cattle, and horses. The lower areas are extensively grazed, by goats and temporarily by sheep and cattle. Land suitable for permanent agriculture is found only on the gentle slopes and on colluvial deposits in the lower Andean area.

4.38 *Hydrology*. Highland hydrology includes permanent, seasonal and sporadic watercourses. Highland Rivers west of the Andes drain to the Pacific Ocean, and those east of the Andes drain to the Amazon River and its tributaries like the Urubamba drainage basin. The flow volume of primary rivers such as the Pampas, Vinchos, Huaytará, Torobamba and Yucay range up to several hundred m^3/sec during stream growth, to just 1 or 2 m^3/sec during stream ebbing. Downstream river flow is generally strong and rapid while upstream rivers are much slower, fed by *bofedales* (swampy terrain) throughout the dry season.

4.39 *Water Quality*. Twenty-two monitoring points were established during the baseline studies in the highlands sector along rivers and ravines that entered the direct area of influence of the gas pipeline. All waters tested low for dissolved solids and heavy metal concentrations except for the Curiyama and Rangracuna canyons, which exceeded the maximum allowable value of arsenic of 0.1 mg/L for Class VI Waters under the General Water Law. No information was gathered regarding the quality of the ground water, nor the *bofedales*, which are fed by groundwater at shallow depths.

4.40 *Flora*. The Andes have three main vegetation formations: 1) Inter-Andean valleys characterized by high proportions of giant cacti on barren plains, deciduous dry forests, thickets of resinous shrubs, rare evergreen foliage forests and thorny scrub; 2) Upper-Andean vegetation characterized by remains of Polylepis (*queñuales*) forests, puna grasslands and aquatic vegetation; and 3) the Western flank characterized by thorny scrub, predominantly Lupinus brushwood and cacti and leafless bushes.

4.41 Areas of high biodiversity and low sensitivity include the sparse evergreen woodland, the grasslands and the spiny and resinous shrublands of the Andean plateaus. Highly sensitive vegetative formations include the columnar cacti, the dry deciduous woodland, the *Polylepis* woodlands, and to a lesser extent, the wetlands (*bofedales*).

4.42 *Fauna*. A total of 95 species of birds and 15 species of mammals were identified during the baseline studies. The analysis indicates a direct relationship between vegetation coverage and diversity of birds and plants. Rodents were the most representative taxonomic group among the mammal species, however new world camelids like the *vicuña*, carnivores and marsupials were also registered. The *vicuña* is considered by the International Union for Conservation of Nature (IUCN) as a vulnerable species. These could suffer some disturbance from construction of the pipeline, primarily a disruption in their access to water and in their reproductive period between the months of February and April. The aquatic environments studied presented a variety of benthic organisms, 103 plankton species, with phytoplankton being the most prominent, and only four fish species, including one non-native species.

4.43 *National Parks and Protected Areas.* There are no national parks or protected areas in the Andean segment of the Camisea Project.

4.1.3 Coast

4.44 The coastal stretch of the gas pipeline is 32.25% of the total route. The coastal region, the smallest region of Peru west of the Andes range, is a narrow strip of land that extends North to South along the Pacific shore. The coastal sector of the pipeline extends from kp 455 to the City Gate in Lurín (Department of Lima). The Distribution project begins in the coastal urban area of the District of Lurín, and reaches the Ventanilla District, located north of the city of Lima.

4.45 The site for the fractionation plant and the marine terminal (Upstream) is at Playa Lobería, located in the southern outskirts of Pisco, within the buffer zone of the Paracas National Reserve (Department of Ica). The direct area of influence is highly disturbed, surrounded by urban centers, suburban areas, and areas dedicated to industry (fish), agriculture, and tourism.

4.46 General environmental characteristics of the direct and indirect area of influence of the pipeline, fractionation plant and Distribution Component are presented below.

4.47 *Climate and Meteorology*. The coastal segment of the pipeline route is an arid to semi-arid region with annual rainfall that ranges from 10 mm to 50 mm. Temperatures show little variation, although higher temperatures are found in the central desert. Winds consist mainly of light to moderate breezes at speeds of up to 50 km/hr. Paracas winds are the strongest reaching speeds of up to 80-90 km/hr from West to East.

4.48 The site of the fractionation plant and marine terminal is located in a subtropical climate that receives little precipitation. The Plant will be located in the buffer zone of the Paracas National Reserve and will receive climatic influences from the Paracas Bay. Overall, the region has two marked seasons: summer and winter. Precipitation during summer months is approximately 0.6 mm and 0.09 mm during the winter months. The area is for the most part hot and dry.

4.49 *Air Quality and Noise.* The most common air pollutant sources that affect the air quality in the Project area of influence are: industries and vehicles in the Lurín area, and eolian erosion and vehicular traffic in the Mala, Cañete and Pisco area. As part of the EIA baseline studies, air quality (particles and gases) was tested periodically from three monitoring stations. All parameters tested were below permissible limits for Class VI waters as per the General Water Law and those set forth by USEPA and WHO. However, noise measurements in urban and industrial areas surpassed the allowable permissible limits. Noise around the fractionation plant site originates primarily from vehicular traffic, the fish meal industries south of the site, and aircraft from the nearby military airport of San Andres.

4.50 *Geology and Geomorphology*. The geology of the coastal plains consists of highly weathered rock formations of carbonate and siliceous Quaternary rock.

4.51 The coastal geomorphology along the pipeline corridor provides favorable conditions in terms of its topography and erosive processes. The strip of land occupied by the Ñoco and El Carmen pampas (plains), where periodic and irregular torrents flow through small gullies that unexpectedly change course direction, may pose a geodynamic risk. Risks are also posed by

the alluvial belts formed by the Topará, Asia, Chilca, Río Seco rivers and Cruz de Hueso canyons, as well as the seasonal Mala, Cañete, Chico, Matagente and Pisco riverbeds, which are all prone to flooding. Particularly risky areas are the coastal marshes of the Chilca region.

4.52 The site of the fractionation plant sits on an active plate margin and a subduction zone on the Pacific Ocean, and is of medium risk to seismic activity and tsunamis. However, the protected nature of the Bay makes the site less vulnerable to tsunamis than other areas such as Playa Silencio and Playa Clarita, both located on open coastlines. The geology of the area has an arid, semi-desert topography, composed of alluvial sands and rocky shorelines.

4.53 *Soils*. Coastal valley soils are suitable for crop farming and grazing. In addition to dry farming, irrigation provides the ability to cultivate a variety of crops. In spite of several unfavorable conditions, coastal soils can be very productive when intensely irrigated, achieving crops of low to medium quality. Coastal valley soils are considered to be among the countries most suitable for crop farming.

4.54 *Land Use*. This region has six land uses or zones designated as: urban or industrialized areas, government or private land, agricultural areas, archaeological sites, reserved areas, and dump sites. Agriculture is primarily practiced along the Pisco River (San Andres). Land use along the gas pipeline route in the coastal zone is varied, with large concentrations of poultry farms and cattle raising, particularly between Cañete and Lima. The proposed site of the fractionation plant is primarily used for subsistence fishing, commercial fishing (including scallop aquaculture), agriculture, mining (steel and tin, predominantly), fishmeal industries, and tourism.

4.55 *Hydrology*. As a result of the arid climate, the coastal area has few permanent watercourses. Active flows are typically the result of precipitation and runoff from the highlands draining to the east. Most coastal rivers are permanently dry, except for a few that receive substantial runoffs of a few m^3/s. Other torrents, sometimes called rivers, such as Topará, Chilca and Asia have streams that carry water during the winter season and then remain completely dry for several months. The pipeline route will cross several irrigation canals that supply water to local farms.

4.56 The marine terminal for the fractionation plant will benefit from low waves that break far from the coastline. Bottom currents and eddies cause much of the mixing of the waters along the coast. Cold, upwelling water originating from the Humboldt Current is primarily responsible for the high biological productivity and diversity in the area. Waves and long shore drift travel northeast and up the coast.

4.57 *Water Quality*. The fishmeal industries are responsible for much of the polluted waters found in the coast. The discharge of organic content from these industries has resulted in high concentrations of sulfur, oxygen and high biological oxygen demand in sediments causing the death of many species. Sediments have also been contaminated by hydrocarbons (374.5 to 1083.8 mg/kg) as a result of boat spills and vessels entering the ports.

4.58 *Flora*. Coastal vegetation formations include *tillandsiales*, arid scrublands, woodlands, salt marshes and giant cacti associations. Diversity and abundance of vegetation becomes almost non-existent closer to the mountains, where the landscape is composed of extensive areas of sand dunes. *Tillandsiales* are vegetation formations found only in the coastal regions of Peru

and Chile, consisting of one or two species of *Bromeliaceae* of the *Tillandsia* genus. 48 species from 23 families of birds were surveyed. Eight species are considered highly sensitive to environmental change, particularly to climatic shifts. All birds surveyed are fully dependant on the sea or other bodies of water and are not considered to suffer impacts from the construction of the pipeline.

4.59 Thirty-two specimens belonging to six reptile species and one amphibian species were recorded. Thirteen species (among those recorded and those potentially in the area) are considered sensitive to impacts and are almost exclusively found only in the central area of the coastal desert. The location of the proposed marine terminal and fractionation plant is highly disturbed. Interior areas of the site support limited vegetation. The beach is primarily covered with large and medium-sized rocks, several feet of shells (remains of the shell fish activities) with very few areas of pure sand.

4.60 The Bay of Paracas is a highly biologically diverse, sensitive ecosystem on which a number of species depend. Of the 1,177 species of flora found in the Paracas National Reserve (GEA, 1999), 94 species were surveyed (without including plankton microorganisms) in the area of the project and its corresponding area of influence, representing approximately 10% of the total of the biodiversity reported. The Bay is an important bird refuge; 71 species were recorded, many of which are threatened or considered as vulnerable by CITES.

4.61 *Fauna*. Nine bodies of water were surveyed during the baseline study. Specific phytoplankton diversity is moderate to high, with a mean density of 86 organisms or cells/ml. Macro-invertebrate diversity (mainly arthropods) is low compared to other coastal water bodies. Fifteen species of benthos were reported. Overall, fish diversity is low: 6 species of bony fish, three fresh water (primary), two that tolerate greater salinity (secondary), and one of marine origin that has adapted to continental waters (peripheral).

4.62 The site proposed for the fractionation plant, just north of the Paracas National Reserve, is frequented by whales, sea lions, sea otters, and marine turtles that use the marine environment to feed, reproduce, and as a refuge. The Bay of Paracas is also recognized for it's rich diversity of shellfish. The Chilean northern scallop, conch/murex, crabs and ribbed mussel species are harvested every year. Scallop mariculture is conducted primarily in the Bay of Independence along the Pacific Coast of the Reserve, and is an important product to the local economy. Other fish of commercial importance are sardines, anchovy, flathead mullet, smelt, Southeast Pacific grunt, *cojinova*, jack, and bonito.

4.63 *National Parks and Protected Areas*. The fractionation plant and marine terminal of the Upstream Component is located within the buffer zone of the Paracas National Reserve. The Reserve was created in 1975 (S.D. N°1281-75-AG) by the Government of Peru and listed as a RAMSAR[7] Site as part of the 1971 Convention on Wetlands of International Importance Especially as Waterfowl Habitat. The Paracas Reserve covers a total area of 335,000

[7] The RAMSAR convention aims to prevent the loss of wetlands and ensure their conservation by establishing obligations that the signatory country (Perú) must comply with in order to ensure it's long-term protection and sustainable use.

hectares, of which 217,594 are marine and 117,406 are terrestrial, and is considered of ecological importance because it contains representative samples of natural formations and biological diversity (mostly fauna) found only in the Subtropical Pacific Deserts and the Warm Temperate Pacific Deserts of Chile and Perú.

4.2 Social-Economic

4.64 The socioeconomic conditions in the area of direct and indirect area of influence of the Project are described in this section for the same geographic and geophysical sectors as in the environmental conditions (Section 4.1). Each of these sectors has a distinct socio-cultural and economic character.

4.2.1 Rainforest

4.65 The Urubamba Basin of the Peruvian Amazon, located between the Machiguenga Communal Reserve and the Manu National Park, is the area of direct and indirect influence of the Upstream and Downstream Components of this Project. The Pongo de Mainique, located south of Block 88, divides the Urubamba Basin into Lower and Upper Urubamba. The activities of the Upstream Component are concentrated strictly in the Lower Urubamba while the Downstream Component crosses both Lower and Upper Urubamba from kp 0 at the Las Malvinas Plant (Upstream Component) to kp 182 of the Andean ridge. Below is a summary of the main socio-economic characteristics in the area of direct and indirect influence of the Project.

4.66 The Lower Urubamba region (area of influence of the Upstream Component) has one of the largest concentrations of native indigenous peoples in Peru. The EIA baseline study for the Upstream Component found a total of 22 settlements in the direct / indirect area of influence of the Project; all of them duly recognized by the state and hold land titles. Nearly 80 to 90% of the population in the Lower Urubamba is native or indigenous. Demographically, studies estimate there are some 4,000 native peoples, approximately 150 "colonos" (settlers or non-natives), and an undetermined number of indigenous peoples living in voluntary isolation within the lands reserved by the state in benefit of the Nahua Kugapakori ethnic groups.

4.67 The settlements living in the direct area of influence of the Upstream Component are the native communities of Cashiriari, Segakiato, Shivankoreni, Camisea, Ticumpinia, Kirigueti and Nuevo Mundo; and the "colono" settlements of Tupac Amaru. Those considered as living in the indirect area of influence are the native communities and colonos living along the banks of the Urubamba River, downstream from Nuevo Mundo towards Bufeo Pozo (Nueva Vida, Nueva Luz, Sensa, Miaria, Puerto Rico, Sepahua, Puija, Sheboja, Bufeo Pozo) Nueva Unión, Puerto Huallana, Mayapo, Camaná, and Timpía.

4.68 The Downstream Component runs through both the Lower and Upper Urubamba areas. An estimated 90% of the pipeline in the rainforest span crosses the districts of Echarate and Quimbiri, both located in the Upper Urubamba with a combined population of 78,000. Of these, less than 5% are of native or indigenous origin, mainly of Machiguenga (ethnic group) descent, as well as (in much smaller numbers) Ashaninka, Nahua, Caquinte, and Nanty, all of who inhabit the headwaters of the Timpía River on the eastern bank of the Urubamba River.

4.69 The social baseline study for the Downstream EIA found 16 settlements living in the direct area of influence of the pipeline in the Upper Urubamba and four in the Lower Urubamba. These are: the native communities (4) of Poyentimari, Monte Carmelo, Shimaá, and Aendoshari and the rural communities (12) of Mantálo, Alto Manugali, Teringabeni, Nueva Esperanza, Alto Shimaá, Palmeiras, Itariato, Nueva Esperanza-Itariato, Manatrushiato, Cgakiato, Poyentimari, and Villa Quintiarina in the *Upper Urubamba*; and the native communities (3) of Ticumpinía, Timpía, and Camaná and rural community (1) of Tupac Amaru in the *Lower Urubamba*.

4.70 *Social Structure and Composition*. The Urubamba Basin is characterized by a low level of socio-economic development. Social indicators demonstrate high levels of fertility and fecundity (7.3 children/women), high infant mortality rates (126/1,000), low life expectancy rates (49.5 years) and financial income (US$60/year), combined with limited access to low quality social services and infrastructure, all of which signify a low standard of living among most of the population. The population growth rate is higher than the national and average rural rates registered in Peru (3.5% year). Population density is low with large unpopulated areas of undisturbed tropical rainforest and a total density of 1.3 and 7.6 inhabitants/km² of arable and pasturelands respectively. The high levels of fertility determine the high proportion of infant population under the age of 15, 51.7% of the population.

4.71 Most of the rural settlers in the Lower and Upper Urubamba region have migrated from Quillabamba located on the eastern slopes of the Andes in the Department of Cusco, and from other Andean communities (Cusco, Ayacucho, Apurímac, and Puno) where possibilities for land acquisition and social services are even more limited than in the rainforest and social and political unrest have led them in search of peace and economic opportunity. Non-natives enter the rainforest by crossing the Pongo de Mainique, and settle in isolated areas where they work on cattle raising or commercial agriculture (coffee, cacao and achiote).

4.72 Natives in both the Lower and Upper Urubamba predominantly live dispersed in extended families or clans near other native settlements. These groups speak their own dialect (depending on their ethnic origin), live in communities of extended families, and make collective use of the land. The entrance of the Catholic and Evangelical Churches to the region (between 1902 y 1918 for Catholic Church, more recently for Evangelical Church) had a strong influence on the settling patterns of these communities. Today, most native communities in the Lower and Upper Urubamba have organized and gathered around a school established by a catholic missionary or a native teacher associated with the Summer Language School (ILV). The church or schools serve as an “integration” center that provides complementary medical assistance, basic infrastructure, and production projects to the native people.

4.73 The non-contacted or voluntary isolated groups live in the lands reserved by the Government in benefit of the Nahua Kugapakori peoples. Block 88 overlaps these lands, occupying approximately 3% of the reserved lands. Groups in semi-isolation or recently contacted live in the upper and intermediate areas of the tributaries of the Urubamba River and settle in formal communities. The most numerous ethnic group among the voluntary isolated groups is the Kugapakori, also called Nantis or Kirineri, with a population of about 1,500 people. The referred group settles in the Camisea, Timpía, Ticumpinía, and Pakiria rivers. Another important group is the Nahua or Yura, located in the Upper Manu, Mishagua, and Upper Piedras Rivers. The total estimated population of the Nahua is approximately 250. Also within

the reserve is the Nahua settlement of Santa Rosa de Serjali (180 peoples), and the settlements of Marankiato (90 people) and Montetoni (220 people) (Nanti). These settlements are not considered to be within the direct or indirect area of influence of the Project.

4.74 *Education*. The level of education received by the natives living in the direct area of influence of the rainforest span of the Project is low in comparison to the Peruvian national average. Although the colonists of the rainforest typically benefit from better access to schools, religious, municipal and private entities provide the native populations with resources and infrastructure for educational instruction. Results of a 1993 population census indicated that 69% of the population over the age of five knew how to read and write and 52% had achieved at least elementary level schooling. Illiteracy, although still significant, diminishes rapidly among the youngest segments of the population. Education in the Urubamba Basin is offered at least up to an elementary level. Middle and high schools are only available in the more populated and better-accessed communities and generally run on a one-teacher system - where a single teacher is responsible for educating all school-aged children of a community. Children are taught in Spanish and in the dialect of the ethnic community. Some community's even receive instruction in the English language.

4.75 *Health*. The health conditions of communities in the direct and indirect area of influence of the Project are primarily linked to nutrition levels, water quality/potable water supply, hygiene, access to health care, and exposure to transmitted diseases. Community infrastructure is poor, most lacking access to latrines, potable water, and adequate waste management infrastructure and practices. Life expectancy in the rainforest is roughly 50 years and the infant mortality rate is 126 per 1000, below and above the national average respectively.

4.76 The Department of Cusco, through the Ministry of Health, is responsible for implementing Health Programs to the communities in its jurisdiction. Since health care centers are primarily located in rural settlements, the colonists of the Upper Urubamba enjoy better geographical and economic access to health facilities and treatment, than the native communities of the Lower and Upper Urubamba. Only 35% of the population located in the direct area of influence of the pipeline (mainly the Upper Urubamba) has direct access to health care. The obstacles include difficult access to dispersed population centers, high cost of medicine, and lack of money in circulation, particularly in the native Machiguenga communities.

4.77 Only two health stations, Timpía and Camisea, and one Health Center (Kirigueti) in the Lower Urubamba are staffed with physicians, health technicians, nurses, laboratory technicians, and an obstetrician (only at Camisea). Adults and the elderly are particularly affected by the general lack of medical assistance and treatment available to more serious illnesses. Only the Sepahua and Pucallpa health facilities (in the Lower Urubamba) are equipped with the expertise or tools to carry out x-rays or surgical procedures. Most health stations lack medical supplies or are unable to offer timely diagnosis or treatment of illness or disease. The responsibility of the health station is to supervise the implementation of vaccination programs, diagnostic evaluations (until further treatment can be arranged with the nearest doctor), and promoting and fostering health, hygiene, vector control, as well as the construction and use of latrines and potable water networks.

4.78 The indigenous peoples of the Lower and Upper Urubamba lack resistance to external vectors of disease making them vulnerable when contacted by outsiders that roam the rainforest in search of land and opportunities. The main causes of mortality and morbidity

among the indigenous and native people include malnutrition, respiratory illnesses, dehydration, dysentery, and vector-related diseases. Mortality rates from disease, trauma and lack of healthcare are much higher in the Lower Urubamba than in the Upper Urubamba. Communities of the rainforest also have high incidences of bite-transmitted diseases like typhoid, yellow fever, and malaria. Native populations appear to have a noted resistance to tropical diseases compared to colonists.

4.79 Native and non-native communities living in the rainforest area of influence of the Project communicate with external entities through radio transmitter. A problem faced by rainforests communities is the lack of prompt means of transportation to evacuate ill or injured peoples of the rainforest to large well-equipped medical facilities for treatment. This is aggravated by the fact that neither river or air transportation are possible during a 12 hour nighttime period. Only Kirigueti, Nuevo Mundo, and Timpía have a landing strip that facilitates the logistics of an aircraft.

4.80 *Infrastructure*. As a result of its remoteness, the area traversed by the pipeline project is characterized by a low standard of basic services. Few communities have piped water, most rely on water from wells or springs for consumption and the majority of the communities lack electricity and use a radio transmitter as their only source of communication with the external world. The primary means of transport in the region is achieved by boat on the Urubamba River and its effluents. Other access to the Upper Urubamba is done by road on the Echarate-Palma Real-Kiteni-Tintinikiato and Kiteni-Kepashiato. These roads become impassable in the rainy season and do not reach the isolated rainforest communities in the Urubamba Basin. Rural and native communities inside the Urubamba Basin communicate by internal trails cleared inside the forest that connect with other settlements in the region.

4.81 *Land Use and Economic Activity*. Agriculture is the primary economic activity practiced by communities living in the rainforest. Seventy per cent of the agricultural units have or are in the process of receiving private titles to their land while about 23% are held in communal ownership. Native communities use or own parcels of between 2 and 15 ha while colonists use lands that range from 60 to 300 ha. Native communities are oriented towards a subsistence economy based on crop cultivation of coffee, cacao, corn, yuca, rice, beans, and coca; and subsistence hunting, fishing and collection (food, medicines, textiles), and extraction of forest products (e.g., wood and palms).

4.82 The communities of the Lower Urubamba sell or trade crops and forest products to local markets to obtain necessary household items or manufactured goods. The communities of the Upper Urubamba dedicate an area of their parcels to the cultivation of commercial crops (cacao, cafe and achiote), making use of available technology and allowing greater access to markets. Colonists practice commercial agriculture (coffee, cacao and achiote). Farms are generally larger, specialize in few crops and benefit from the use of fertilizers and pesticides. Some colonists in the Lower Urubamba also raise livestock to sell to the market economy.

4.2.2 Highlands

4.83 The people affected by the pipeline route in the highlands span reside in rural areas in the Provinces of Huaytara, Cangallo, Huamanga, and La Mar in the Departments of Huancavelica and Ayacucho, respectively. The populations most affected by the Downstream

Component live in the south central Andes and the main stakeholders are the rural communities and small landowners whose properties will be affected by the pipeline.

4.84 *Demographics*. The average population density in the Andes is 17 persons/km, ranging between 4 persons/km in the district of Huaytará to 62 persons/km in the district of Huamanga. The pipeline route affects 35 peasant communities, 6 peasant groups, and 7 annexed communities and small rural properties. The population directly affected by construction of the pipeline is estimated at 16,000.

4.85 The peasant community is the dominant social form of organization in the area of influence of the pipeline. These communities have communal assemblies and communal boards whose function and structure vary between those in the high Andean communities and those located in the valleys. For the most part, communities in the high plateau exhibit a greater level of social cohesion and are more isolated from external contact. They rely more upon traditional norms to regulate conduct than the communities in the valleys.

4.86 *Infrastructure and Services.* The majority of the rural communities along the pipeline route are found concentrated in small settlements of 30 to 40 houses. Communities in the high mountains are more dispersed than in the valleys. These remote rural communities lack potable public water supplies, relying on streams, spring or well water for consumption. Sanitary and health facilities are for the most part poor or lacking all together in many rural communities. Some district capitals and only two peasant communities have access to electricity. The principal means of access between the communities and larger villages is the Via de Los Libertadores, a two lane paved highway that runs across the Andes into the Coast. Access between communities is done on narrow trails.

4.87 *Education*. The social baseline conducted as part of the EIA indicates the precarious nature of the basic educational infrastructure in the direct and indirect area of influence of the pipeline. Two thirds of the population in the highlands span has only a primary level of education. Most rural communities are only offered primary level education. Children of remote settlements must travel to larger and more accessible communities to benefit from middle or high school education. One of the most important factors attributed to absenteeism in schools in this region is the overlap in the schools timetable with the calendar of agricultural activity, which children and adolescents take part in to contribute to their family's subsistence.

4.88 *Health.* Health services in the highlands span are mostly concentrated in urban centers of the Andes. Poor infrastructure and lack of access between isolated rural communities and larger urban centers makes it difficult for rural settlers to gain access to health care and benefit from timely diagnosis and treatment of illnesses and disease. Only 14 of the 48 communities directly affected by the project have health centers or posts. Most of these are poorly staffed and lack medical supplies and technology, leaving many peoples vulnerable to illness and death, of which the most common causes are acute respiratory illness and diarrhea. Extreme poverty among isolated rural social groups in the Andes exacerbates the overall health conditions of its people, especially children, of which nearly 50% are thought to be malnourished. Other common illnesses in the region include yellow fever and typhoid, primarily caused by the seasonal migration of people to the rainforest in search of work.

4.89 *Land Use and Economic Activity*. The Andean peoples have suffered decades of conflict and violence that have impacted their social cohesion and economic outlook. These people are

primarily rural, organized in peasant union movements that principally demand better working conditions, access to education and ownership of land. The market economy practiced in the last decades has worsened their levels of poverty and caused waves of migration to either side of the Andes in search of other and better opportunities.

4.90 The primary economic activity in the direct and indirect area of influence of the pipeline route is primarily dry farming and cattle ranching. Other secondary activities include the production of textiles (wool) and other seasonal labor. The soils and climate of the high Andes are unsuited for extensive crop production and most of the land is in natural pasture for grazing livestock such as vicuña, alpaca and llama. Communities in lower altitudes benefit from fertile soils and irrigation. Agricultural production in this area is market-oriented and the principal cash crop is potato. Small quantities of coca, corn (maize), and wheat are also grown. About 70% of production is for domestic consumption, 10% is stored, and the rest is sold in local and regional markets.

4.91 The majority of land crossed by the pipeline belongs to peasant communities, and to a lesser extent, small rural landowners. The size of communal lands in the areas of direct influence of the pipeline range from 150 to 22,000 ha. Smaller privately held plots typically do not exceed 2 ha . About 36% of the peasant communities and private landowners traversed or directly impacted by the pipeline do not own titles to their land(s).

4.92 C*ultural Resources*. The baseline studies for the Downstream EIA found 31 archeological sites along the highland span belonging to different historical periods. Most are from the late intermediate period of the Chanca Culture (1100 to 1470 AD) or Inca (1460 A.D. – 1533 A.D). Some sites are thought to contain remains from the 500-900 A.D. period because of their closeness to the Ayacucho valley, ancient home of the Huari Empire. The Downstream Company TGP is carrying out in-depth archeological surveys as part of an "Archeological Evaluation Project" with the Institute of Culture to determine the total number of sites of archaeological importance that exist along the pipeline route.

4.2.3 Coast

4.93 The people affected by the pipeline route in the Coastal Area belong to the Provinces of Pisco and Chincha of the Department of Ica and the Provinces of Cañete and Lima of the Department of Lima. Most of the coastal span of the pipeline is desert zone separated by Chilca, Mala, Asia, Cañete, Chincha and Pisco valleys, where small towns, marginal and rural are situated.

4.94 *Demographics***.** There are 56 populated centers (14 urban and 42 rural) along the pipeline route in 10 districts in the provinces of Chincha, Pisco, Lima and Cañete. The pipeline route crosses mostly small, medium and large private farms and agricultural cooperatives and peasant communities. The 10 districts traversed by the pipeline have a total population of approximately 120,000 inhabitants, of which nearly 25,000 live in the area of influence of the pipeline ROW. Population density ranges from 31/km² in Cañete, 38/km² in Pisco, 58/km² in Chincha, and 1,781/km² in Lima. The coastal districts have experienced rapid growth in recent years from migrants that have fled the Departments of Ayacucho and Huancavelica because of political unrest and violence.

4.95 The primary direct area of influence of the fractionation plant and its export terminal will be the town of San Andres (population of 12,531), located on the coastal corridor between the city of Pisco and the Bay of Paracas. The Pisco-Paracas corridor is densely populated with approximately 66,000 people. The corridor is predominantly urban with Pisco representing about 80% of the population, and San Andres 16%. The districts have had a gradual decrease in the size of their population during the last twenty-five years due to a crisis in the fishmeal industry.

4.96 *Infrastructure.* The majority of homes in the coastal zone have access to public services such as water, sewerage, electricity and telephone. The primary means of communication between districts is the Pan-American Highway that runs between Lima and Pisco, and the Los Libertadores Highway that connects the coast to the Andes. Paved roads connect capitals of districts and provinces and secondary roads connect smaller, generally rural towns. The roads are the primary access for commercial exchange and local transit is considered adequate.

4.97 *Education*. The coastal zone benefits from the presence and availability of good government services in the region. This makes access to and the quality of education received higher than in the rainforest and highland spans affected by the Project. Nearly 45% of the adult population has completed secondary school education and 21% has had some type of college training.

4.98 *Health***.** Access to health services in the coastal sector is high in comparison to the Andes and rainforest segments. Typical causes of death or illness include respiratory illnesses, infectious diseases and parasites. The infant mortality rate at over 42 per 1000 is close to the national average.

4.99 *Land Use and Economic Activity.* Land use is varied along the pipeline route. There are populated areas with extensive infrastructure, irrigated commercial agriculture (fruits and vegetables), agroindustry, and commercial and support services. Unlike the rainforest and highland zones, this region has access to capital investment and new technology.

4.100 The population is for the most part composed of small agricultural holders that possess legal title to their land. About 87% of land is privately owned, 5% is leased, and 4% is under communal ownership. Smallholdings range from less than 5 ha to as much as 20 ha. Medium and large landowners cultivate areas from 20 ha to 100 ha. The main economic activity among the population affected by the fractionation plant is tourism, other services, and the fishmeal industry.

4.101 C*ultural Resources***.** The coastal zone has a high density of archeological sites. Archeological evidence recorded along the route of the gas pipeline reveals varied human activity of pre-Hispanic times. Evidence found varies from shell deposits, ancient cultivated terraces, cemeteries, temples, large architectural complexes, corrals, villages, isolated dwellings, etc. These remain from a number of pre-Hispanic periods that range from 4500 B.C. (Paloma site) to 1500 A.D. (Cerro Azul and Tambo Colorado). Many of the sites correspond to the intermediate period (1100-1400 A.D.), the largest being the “Los Huacones” sector in the Cañete valley.

4.102 The area of the Paracas National Reserve holds a number of archaeological sites that belong to the Nazca and Inca cultures. There are remains of former cultures in over 229 hectares with over 100 archaeological sites of all stages of evolution. Of these, three have been identified as sites that could suffer impacts from the construction of the Fractionation Plant and Marine terminal. Two lie between or just within the construction area of the Fractionation Plant and the coastline. The other, a cemetery dating back to approximately 600 A.D., lies midway between the easternmost and westernmost boundaries of the site. This former graveyard has been extensively disturbed by modern exploitation. Human remains, mummified fabrics and ceramics are found scattered inside the area. Approximately 30 stratigraphic digs are currently being conducted around the site to determine if other potential archaeological sites exist.

5.0 ENVIRONMENTAL AND SOCIAL IMPACTS

5.1 The Camisea Project comprises three principal components (Upstream, Downstream and Distribution) that develop along three significantly different ecosystems in Peru: the rainforest, the highlands and the coastal areas. When addressing the Camisea Project as a whole (i.e., the three components together), the most significant potential impacts of the Project are medium to long-term indirect impacts in connection with (i) possible intensification of extractive activities (e.g., oil and gas exploration and forestry) in the area reserved by the State for the benefit of the Nahua-Kugapakori indigenous groups and in the Lower Urubamba area; and (ii) possible increase in access to the Lower Urubamba by illegal settlers, loggers and hunters by using the pipeline ROW. These could result in a potential loss of biodiversity in the rainforest portion and to severe threats to the physical, social and cultural integrity of the indigenous communities. Other key potential impacts of the Camisea Project are related to the installation of the fractionation plant and marine terminal in the buffer zone of the Paracas National Reserve. These include risks of potential spills and associated effects on the biodiversity of the Paracas Bay and risks of increased undesired industrial development near the Paracas Bay and the Paracas National Reserve. Mitigation of these potential impacts requires a coordinated effort between the Camisea Project Companies and the GOP (see Section 6 for details on mitigation of impacts).

5.2 During construction, the majority of the potential direct impacts are temporary and will discontinue once construction activities are terminated. Possible impacts include: temporary loss of vegetation; potential water and soil contamination related to sanitary and industrial wastewater discharges, waste disposal, and spills of petroleum products; soil erosion and storm water runoff; generation of dust and air emissions from earth moving equipment; potential social and environmental impacts of increased noise due to helicopter flights, construction vehicles and works; environmental and social impacts associated with worker camps and temporarily increased traffic on existing roads; impacts on sensitive ecological areas, such as small rivers and streams, flood lands and swamps; and potential loss of archaeological remains. Although temporary, some of these impacts can be significant, in particular when affecting drinking water sources and resources used by the communities. In terms of potential social impacts, the main concern is related to indigenous people, including those living in voluntary isolation, primarily the introduction of diseases unknown to these peoples, which could harm their physical integrity and survival. Therefore, specific

environmental and social management procedures were developed to mitigate or avoid, to the extent possible, such impacts (see Section 6 for details).

5.3 During operations, the potential direct impacts that are likely to occur are not as significant as the indirect impacts addressed above, and can be mitigated by the Project Companies with the use of existing technology and good practice in environmental and social management of the oil and gas industry. Among the potential direct impacts are: vegetation loss (routine vegetation trimming); contamination of water and soils; flare and light impacts, air and noise emissions, waste water discharges, solid and hazardous waste management; and pipeline leaks or failures, which could result in indirect impacts to the water resources, to flora and fauna, and to the local communities.

5.4 This section presents a summary of the principal potential environmental, social, and health and safety impacts and risks of each of the Camisea Project components: Downstream, Upstream and Distribution, for both construction and operations phases. In order to assess the Camisea Project's potential impacts, the IDB environmental and social due-diligence relied on various sources of information, including project EIA and associated studies and plans, field observations from numerous site visits to the Camisea Project, reports from the independent monitoring performed by both the Project Companies and IDB, and information and reports from the GOP, local communities, Peruvian and international NGOs, and other stakeholders. Additional information on the Project Companies performance can be obtained at the Project's website (http://www.camisea.com.pe). The principal environmental, social, and health and safety impacts of the three Project components are summarized in the following sub-sections: 5.1 – Construction Phase, and 5.2 – Operation Phase. Section 5.3 provides a summary of positive benefits from the Camisea Project.

5.1 Construction

5.1.1 Downstream Component

Environmental

5.5 The pipelines route extends for 715 kilometers, through three major geophysical and ecological regions, from the rainforest through the Andean highlands down to the coast. The magnitude and significance of the potential environmental impacts vary between the different geographical and ecological regions, and are particularly relevant in the rainforest, which supports some of the most sensitive and biologically diverse ecosystems in the world. Because of the rich species' diversity and degree of endemism, the rainforest of Peru has been identified as a priority for conservation and preservation efforts. Approximately 25% of the pipeline ROW is located in rainforest area, and of that portion, approximately 55% is on secondary forest or agroforestry land. The area crossed by the pipeline in the Andean highlands is sparsely settled, and the major land use is grazing and crop production. In the coastal sector, the pipeline will pass through agricultural land in the Pisco, Chincha, Cañete, Mala and Lurin valleys (cotton, vegetables, fruit, pasture, etc.). In areas crossed by the pipelines ROW, there will be temporary loss of function and productivity in croplands, pastures and wetlands during and immediately following construction.

5.6 During construction of the Downstream component, the principal potential environmental impacts are related to: temporary loss of vegetation, potential erosion, sedimentation, and

accidental spills of oils and lubricants (which could potentially affect local community' sources of drinking water) and accidental destruction of archaeological remains. Additionally, in the highland areas, principal potential impacts are also related to effects of construction on the shallow-water springs (*bofedales*) used by cattle and other animals. In the coastal area, another concern is associated with the potential impacts in agricultural lands and irrigation canals. A summary of the principal potential environmental impacts for the construction of the Downstream Component is provided below.

5.7 Loss of Vegetation and Associated Impacts on Fauna. It is estimated that opening the entire ROW with an average width of 25 meters will require clearing and felling of approximately 592 hectares of forest, woodland and pastures. Loss of vegetation will be greater in the areas covered with primary forest, which accounts for 59% (348 ha) of the total area of the ROW, even with the reduction of the ROW width to between 12 and 15 meters in such sensitive areas. This is the case of the sector between the rivers Chunchubamba and Sachapampa (mountain forest), where a complex structure and steep gradient house some protected or endangered species such as orchids and species of *podocarpaceae*, as well as valuable timber-producing species (*podocarpaceae, lauraceae, meliaceae*). In the Upper Urubamba, agriculture has already reduced approximately 78 ha of primary forest (see Table 5-1). In the highlands, loss of vegetation is minor. The coastal area is mostly sand desert, with the exception of the agricultural valleys.

5.8 Base and satellite camps and additional staging areas for construction equipment and materials are planned for locations scattered along the pipeline route. In addition, clearing is also required for the associated facilities such as pump stations, pressure reduction stations, scrapper traps, and block valves. Nevertheless, the footprint of these facilities is relatively small. Satellite camps affect approximately 4 to 6 ha; pump stations are approximately 4.5 ha, including a helipad approximately 9.1 meters in diameter; pressure reduction stations affect approximately 2.5 ha; scrapper traps require areas of approximately 0.8 ha, and block valves occupy approximately 0.015 ha. The area used to build the access road to pump station 2 will affect 5 ha (10 km by 5 m wide) of secondary forest, pipeline section storage 14 ha, and camps and machinery parking areas 18.00 ha.

5.9 This work in the forest will create a temporary band of open area that may provide a barrier to natural movement of wildlife during construction, especially small secretive forest species. Light penetration into the forest along the ROW can increase the zone of disturbance, by impacting some species and benefiting others, thus disrupting the natural ecosystem's dynamic. Invasive and colonizing species will probably benefit from opening of the ROW. This impact is unavoidable, but of small significance, temporary, and reversible, given that the ROW will be fully revegetated upon completion of construction (with the exception of a 5-meter wide service and emergency access).

5.10 Particularly in the highland areas, an additional concern is related to potential impacts with the *vicuñas*. The vicuña is a protected species that inhabits pastures on the Andean plateau. These impacts were taken into consideration and appropriate mitigation measures were developed for construction activities in-or-near known breeding and rearing areas of these animals.

5.11 Erosion, Sedimentation and Associated Impacts. Erosion and sedimentation are one of the principal direct impacts of the construction of the pipelines. Temporary and permanent

mitigation of erosion and sedimentation has accounted for 20% of the EPC construction costs. Clearing, excavating, grading and backfilling activities require vegetation removal and extensive earthworks that result in temporary soil exposure to erosion, creating conditions for landslides, land slumping, and increased sedimentation in surface waters. Soil erosion and sedimentation are one of the principal concerns along the ROW, particularly in the rainforest, where steep slopes predominate, erosion processes occur naturally, and the rainy season imposes a stop in the construction works from December to March, approximately, and in the highland sector, where soil erosion is already an issue, due to extensive agriculture that has deforested large areas, both level and mountainous, regardless of their suitability for agriculture. During the initial construction of the pipeline, problems with soil erosion were significant. Subsequently, improved mitigation measures substantially reduced the problem.

5.12 Where the ROW crosses steep slopes, side slopes, or oversized rocks, additional ROW width is needed as extra workspace to stockpile additional volumes of excavated soil and rock, thus magnifying the above-mentioned impacts. Vilcabamba, Segakiato, Aendoshiari, Kepashiato, and Shimaa are some areas at high risk of erosion. These impacts are more significant at river crossings, where impacts may potentially affect a larger area downstream of the crossing section. River crossings either employ horizontal directional drilling (Urubamba) or open cutting (other rivers, such as Poyentimari, Mantálo, Cumpirusiato, Chunchubamba, Sachapampa, and various creeks) Directional drilling does not affect the river flow, whereas open cutting involves temporary digging of trenches in two phases in the middle of the river, thus the normal water flow is not interrupted and aquatic species are unaffected. Nevertheless, increased turbidity is experienced for a limited period of time during the construction works. These impacts are temporary and reversible once construction is finalized.

5.13 Impacts on Soil and Water Quality. Potential contamination of soils by waste disposals (domestic and hazardous, such as chemical and fuel used recipients) and accidental spills of fuels and lubricants (from storage areas and vehicles) are of concern during construction. In general, these impacts are localized and of small magnitude, but can be significant if affecting water resources used by the communities. In spite of the waste management procedures implemented by TGP during construction, a number of small spills have occurred, but none resulted in permanent or irreversible impacts to natural resources or local communities. Community drinking water sources were never contaminated with chemicals or hydrocarbons, but were in one case (Shimaa) affected by suspended solids. These impacts were only temporary, and in all cases temporary alternative sources of potable water were provided. In the community of Shimaa, a new water distribution system was provided.

5.14 Water discharges and inadequate disposal of both solid and liquid wastes could affect the chemical and bacteriological characteristics of the water and affect the quality of surface and underground water as well as the aquatic biota. These impacts are in general classified as of small magnitude, with a low probability of occurrence if the adequate environmental management procedures are implemented. Consequently, the risk of significant water pollution from discharges or spillages of hydrocarbons during construction is low. Nevertheless, at some campsites the sanitary effluent systems have overflowed during a period when the workforce was significantly increased to implement the temporary erosion control measures prior to the rainy season of 2002.

Social

5.15 The principal potential social impacts of the construction phase of the Downstream Component include: (i) potential impacts on natural resources used by native and local communities (contamination of drinking water sources; loss of vegetation species used for medicine, hut construction, and other uses; and fish depletion, among others); (ii) air pollution, mainly with dust and hydrocarbon emissions from increased vehicles and truck traffic, in particular in the communities adjacent to the Calca-Kiteni-Kepashiato road, especially during the dry season (approximately April to September); (iii) potential contamination of rivers and creeks, from untreated sewage discharges and accidental spills; (iv) potential increase in migration and uncontrolled colonization; and (v) impacts associated with the presence of campsites near communities and cities, such as Kepashiato, Kiteni and Ivochote (e.g. increased domestic violence, prostitution, and alcoholism, among others).

5.16 Of particular concern is the potential increase in the incidence of diseases among native populations as a result of contact with foreign workers. This incidence is more likely to occur in the native communities of the rainforest. Given that some indigenous personnel will be involved in the work force, there is the potential to contract a communicable or contagious illness and spread it within a local community. The potential for spreading transmissible diseases also exists if there is contact between project personnel and the native communities. With a workforce of up to 3,000 personnel in peak periods, diseases and illnesses can run the full range of viral and bacterial infections to which the native communities have never been exposed to. To mitigate this impact, TGP implements a strict vaccination program and Code of Conduct for all project personnel (See Section 6 for details).

5.17 Fluvial, air and road transportation generate potential impacts, such as (i) increased noise and dust emissions; (ii) increased risk of accidents involving small boats (which are the only form of transport in the native communities), public transport and community vehicles, and hazardous materials (including fuels, that can contaminate the rivers); (iii) disruption of native activities, such as fishing; and (iv) introduction of diseases previously unknown or unfamiliar to the communities, such as dengue and malaria. Indeed, in spite of the mitigation and management procedures developed by TGP as part of the Transportation Plan, a small number of road and river accidents occurred.

5.18 Local communities may become frustrated with the level of job offers, given their high expectations. Other potential social impacts relate to potential economic unbalance among community members and different communities associated with employment during construction and increased demand for goods and services.

5.19 The easement of the ROW is a potential source of social impacts, particularly in the rainforest and highland areas, where a land market is either inexistent or very limited, and where local communities may not easily understand the compensation concepts and criteria. In spite of the fact that TGP has prepared an adequate Compensation Program (see Section 6 for details), during the consultation meetings held with local communities as part of the IDB Public Consultation Program for Camisea in August 2002, some problems were identified related to the implementation of the compensation plan. It was acknowledged that the affected communities and individuals did not always fully understand: (i) the concept of additional compensation for unforeseen impacts at the end of construction; (ii) the use of CONATA's value as a base for negotiation (and not as a final value); (iii) the process for economic valuation of the natural resources; and (iv) the use of different procedures by Pluspetrol and TGP in communities where both companies were involved in compensation.

5.20 Based on the current status of the easement of the ROW and other associated areas, these issues seem to have been subsequently adequately addressed by both TGP and Pluspetrol. Compensation for the easement of the ROW and associated areas (campsites, pump stations, etc.) in the rainforest involved 292 contracts with local communities and individual owners, all of which have already been negotiated and signed and no legal action has been filed. In the highlands, compensation will involve approximately 1,400 contracts, of which 98.5% had been negotiated and signed as of May 2003. As for the coast, compensations will involve approximately 646 contracts, of which 58%[8] had been signed as of May 2003. In all cases, no legal actions have been filed.

Health and Safety

5.21 The principal health and safety risks of the construction phase of the Downstream component are associated with: (i) potential incapacitating or fatal accidents involving construction workers during clearing, excavation and in-trench activities, operation of heavy equipment, and pipelines' construction, such as exposure to torches, explosives, electrical power, and other high-energy sources and associated risks; and (ii) potential incidents and accidents related to the fluvial, terrestrial and/or aerial transport of construction materials and personnel. Workers along ROW may be additionally exposed to slope failure and mudflow conditions in areas of steep exposed soils without cover or adequate drainage. The existing environmental conditions such as difficult terrain and torrential rains exacerbate these potential risks.

5.22 In general, safety risks have proven to be a significant concern during construction of the Downstream component, particularly in light of the adverse climatic and terrain conditions and the accelerated schedule for construction imposed by the GOP as part of the concession contract (with high fines for non-compliance). During the environmental and social due-diligence, the IDB identified significant risks associated with the road transportation, particularly along the Calca-Kiteni-Kepashiato and Pacobamba-San Antonio roads and requested the Company to implement enhanced safety procedures. These enhancements are addressed in Section 6 - Environmental, Social and Health and Safety Management.

5.23 In spite of the safety procedures implemented by the Company, four fatal accidents occurred in the road transportation and one in fluvial transportation. Operation of heavy machinery and other causes accounted for the remaining of the 10 fatal accidents in 2002. However, as a result of TGP's efforts to improve safety performance during construction, the LTIAFR (Lost Time Index Accident Frequency Rate)[9] was reduced from 5.6 in 2002 (January to May) to 1.4 in 2003, in the same period.

5.1.2 Upstream Component

Environmental

[8] Compensation in the coastal area follows the schedule of construction, which is now focused on the rainforest and highlands. For this reason, only 58% of the contract for easement of the ROW have been signed.

[9] LTIAFR = Number of lost time accident + number of fatalities multiplied per million divided per man-hours worked

5.24 The Upstream component comprises two principal sub-components: gas wells and associated facilities in Camisea, and fractionation plant and marine terminal proposed for South of Pisco. Given the different socio-economic and environmental characteristics of the geographical areas where these sub-components are located, the nature of the environmental and social impacts and risks are different. Thus, in this section they are treated in separate sub-sections.

Gas Wells and Associated Activities

5.25 The principal environmental concerns in relation to the gas wells and associated facilities are loss of vegetation and biodiversity, soil and water contamination, and soil erosion and sedimentation, which are summarized in the following paragraphs.

5.26 Loss of Vegetation and Biodiversity. The principal concerns during construction are related to clearing activities done for the seismic operations camp, the Las Malvinas facilities and plant, the gas wells (SM- 1 and SM-3, and CR-1 and CR-3) and flowlines between Las Malvinas and the gas wells. However, the actual overall impact on undisturbed areas is quite small (3 km^2) when compared with the total of 1,435 km^2 of Block 88, of which only 1.2 km^2 are within the lands reserved by the state in favor of the Nahua-Kugapakori indigenous groups[10] (see Table 5-2). This comparatively small area directly affected by the project is not different from the surrounding areas in terms of species, degree of biodiversity or important natural habitats. Thus the project does not entail the significant impact, destruction or severe diminution of the integrity of a critical or other natural habitat.

5.27 The campsite for the seismic operations had been previously cleared by the owners (farmers) for pastureland and also had been used by Shell for their seismic explorations in the past. During 2002, the camp housed the seismic crew, and contained communication, catering, transportation and temporary housing facilities. Upon completion of the survey in October 2002, the camp was dismantled and some of the facilities (kitchen, lavatory) turned over to the owner per their request. The camp area continues to be a cleared pastureland, and there does not appear to have been any long-term impact on the physical resources from the seismic operations conducted during 2002 (no stressed vegetation, no stained soil, no debris piles, no excessive erosional features, etc.).

5.28 Seismic camps and helipads were also established at 75 locations scattered across the survey area within Block 88, each requiring the removal of vegetation over an area of approximately 50 x 50 meters. Upon completion of the seismic survey, the helipads were revegetated and recovery is in progress. The impacts due to construction and operation of the helipads during the seismic survey appear to have been short-term and reversible, primarily related to increased noise (from helicopter traffic, seismic survey, drilling activities), increased soil erosion over a small area and increased demand on local water resources. Originating from the helipads, 1.5-meter wide receiver and source lines were placed during the seismic activities. Placement of such lines required clearing of small trails by removing small trees and shrubs, but large trees were left in place (Trails circumvent trees greater than 20 cm diameter, and the canopy and forest vegetation above 3m remain intact). Roots of small trees were also left intact such that they could regrow quickly. Underbrush was cleared from these

[10] Approximately, 1.47 km^2 were cleared for the flowlines; 0.04 km^2, for San Martín well site; 1.6 km^2, for Malvinas area; and 0.60 km^2, for the 3D Seismic area.

paths and because large trees were avoided, fragmentation effects extend only a few meters above ground level. These trails are not easily recognizable either from aerial survey or ground-level visual survey.

5.29 Drop zones were placed at regular intervals along seismic lines. These zones created several gaps in forest canopy roughly equivalent to the size of natural treefall gaps, and are also unrecognizable from aerial survey. The impacts from the drop zones are similar to the impacts that occur naturally when trees fall, temporary, short-term and reversible naturally without the need of a revegetation program.

5.30 The Las Malvinas base camp is located where the land had been previously cleared for many years of cattle grazing and crops production. An area mostly composed by natural bamboo groves of 1,650 m x 300 m was cleared for the new airstrip. Dock facilities and associated areas of disturbance are limited in size, and a 30 to 50 m wide band of primary forest trees along the banks of the Urubamba River is maintained to provide an effective buffer for the site and limited habitat for birds and other wildlife.

5.31 The project includes construction of 4 well pads for gas extraction and reinjection at pre-existing platforms, SM-1, SM-3, CR-1 and CR-3. Shell Petroleum previously cleared the area for these well platforms for exploratory well drilling purposes. The project envisages enlarging these well pads (from 3 to 7 hectares) and drilling and completing the wells. Environmental impacts of these activities are likely to be of small magnitude, temporary, short-term and mitigable, primarily in relation to: (i) generation of dust (generated by increased air and vehicle traffic, and clearing activities), and the hydrocarbon emissions (from fuels storage and transfer operations); and (ii) noise impacts from the drilling rig and associated equipment (generators, pumps, associated piping, and worker activities), which are likely to be continuous, temporary (last throughout the drilling period of typically six months to one year), and localized within the vicinity of the well pads, unlikely to expand as far as to affect isolated communities within Block 88.

5.32 Other concerns were associated with clearing required for the construction of access roads. The concept of "offshore in land operation" that was adopted by the Camisea Project for construction and operation maximizes air and river transportation, thus significantly reducing the direct potential impacts associated with opening of new access roads. The main materials required are transported by river from Iquitos and Pucallpa up to Nuevo Mundo and Las Malvinas, by barges and flatboats, depending on the navigability of the Ucayali and Urubamba rivers. From Las Malvinas the transport of material and personnel to the area of operations (sub-bases and roaming camps) is mainly by helicopter, since river traffic is less and limited to the conditions of the Urubamba and Camisea rivers. Helicopters are used for transport of personnel, food, camping, topography, drilling equipment, explosives, and recording equipment. The loads are transported to drop zones as external loads (long line technique). The helicopter lifts or lowers the load suspended in the air, without landing, thus limiting the number of heliports to be built and the impacts on the vegetation to a minimum.

5.33 Contamination of Water and Soils. Water quality may be affected by runoff from the ditch collection system of the well pad, disturbed soils and sediment deposition, as well as by sanitary and industrial effluents, if not treated or if overflowed, and accidental releases of petroleum products from storage areas, vehicle maintenance facilities, and/or increased boat

traffic in the Urubamba river. In general, impact on ambient water quality within Block 88 is considered to be minor, given that adequate treatment is provided.

5.34 Quarries and borrow pits implemented in the Urubamba River were potential causes of temporary alterations of water bodies and sedimentation. The riverbank morphology of the Urubamba River was temporarily modified as a consequence of the extraction of construction materials and construction of the wharfs and associated ramps and facilities. This is considered to be minor, given that similar wharfs exist along the river and that no secondary impacts seem to affect the river flow and the riverbed morphology. The quarry has been rehabilitated. These impacts have been temporary and did not affect local sources of drinking water.

5.35 Soil contamination can occur as a result of improper disposal of drilling cuts and spills of fuels and lubricants. The drilling cuts and other residues generated during the drilling operations are spread on the surface after dewatering. These cuts typically have low nutritional value (nitrates, organic matter) to support natural growth and make revegetation difficult. Therefore, unless topsoil is placed on top, improper disposal of drill cuttings can have long-term impacts on the soil. The drilling fluid used is a water-base drilling mud so that all wastes are easily treated and discharged. Freshwater is extracted from nearby streams and used as drilling fluid and treated prior to distribution within the camps. Chemicals used for mud preparation are non-toxic. The water separated from drilling fluids are treated by removal of drill cuttings and sediments, and processed through chemical treatment and monitored prior to discharge. The sanitary wastewater is collected and treated prior to discharge. Stormwater is collected via drainage channels into storage ponds, treated and discharged.

5.36 Because large quantities of fuel will be stored at the well sites, potential leaks and spills are possible, which could contaminate the soil and surface water around the well pads. The probability of such accidents is low, but the impacts could be significant depending on the extent of the spill. Secondary impacts could affect the vegetation and aquatic life in the vicinity of the well pads. This risk is mitigated by the design and installation of block valves and secondary containment and by regularly scheduled patrols of the tank farms and fuel pipelines, which are performed throughout the construction phase.

5.37 Soil erosion. Soil erosion is one of the most significant potential negative impacts on the physical resources, particularly due to construction of flowlines and other facilities. Climatic conditions combined with the topography in Block 88, particularly in the southern portion near Cashiriari indicate that erosion is critical. Early construction works for the flowline between Las Malvinas and SM-1 produced significant impacts, in spite of the temporary erosion control measures that were implemented. Subsequently, mitigation of theses impacts was improved with modifications to construction procedures, increased supervision of construction works, and initiation of the revegetation program and installation of permanent erosion control measures. Nevertheless, erosion in the rainforest will always be a major concern, given that it occurs naturally, in non-affected areas, particularly during storm events.

Fractionation Plant and Marine Terminal

5.38 The principal potential environmental impacts of the construction of the fractionation plant are typical of civil works of this nature, such as increased dust and noise emissions from earth leveling, and potential contamination of water and soils associated with discharges of liquid

effluents and disposal of solid wastes. The land selected for the facility is located in a sandy area that has been used to discard scallop and gastropod shells (as in most of the land surrounding the site). This area was used as a dumpsite for the fishing industry that predominates in the zone, which is a significant source of negative impact on the marine resources.

5.39 In relation to the environmental impacts of the construction of the marine terminal, the principal potential environmental impacts are associated with dredging and pipeline installation, in terms of resuspension of sediment, and potential for contamination from chemicals and fuel releases causing changes in transparency, primary productivity, toxicity, and feeding of marine life. The placement of the four submarine pipes[11] will involve digging a trench onshore and under the sea, up to 3,200 meters from the shoreline. The trench will be approximately 20 meters wide at seabed level and 2m deep. This single trench will contain all four pipes, which will be bundled together approximately 0.6 meters apart. Within approximately 1,500 m of the shoreline, the sediments where trenching will occur are granular materials. Beyond 1,500 m the sediments consist of granular material overlain by fine sediments, ranging from 0 m thickness at 1,500 m from the shoreline to approximately 10 m thickness at 3,200 m from the shoreline (i.e., at the loading/unloading facility). At approximately 1,900 m from the shoreline the whole trench excavation will occur in the fine sediments layer.

5.40 A mathematical sediment dispersion model was used to select the appropriate dredging/trenching technique and to enable the design of the appropriate mitigation measures, which include a trenching plan, monitoring procedures and contingency measures to be implemented throughout the construction phase of the marine terminal. The mathematical modeling for sediment dispersion associated with the proposed dredging during construction of the submarine pipelines allowed for the estimation suspended sediments plume produced by different potential dredging techniques under different current and wind conditions. The Danish model MIKE 21 (2D) from the Danish Hydraulic Institute of Denmark was selected for the hydrodynamic calculation of the velocity and direction of winds and tides. For the calculation of the suspended sediments concentrations, the dredging method and the currents field, the MIKE 21 PA (3D) model, which is part of the MIKE 21 system, was selected. Both models are largely applied to engineering and environmental evaluations for similar works. Data input for the models included bathymetry, tides, currents, sediment composition, and meteorological conditions.

5.41 A total of 16 scenarios were developed, for different conditions of winds and currents (predominant winds are from the south-west (approximately 28% of the time) and the west (approximately 22% of the time)), and different dredging techniques including backhoe (open bucket) and plow (for granular sediments[12]), and clamshel (open bucket and enclosed bucket) and ecoclamshell (cable arm), both for fine sediments[13]. The plume of suspended sediments

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[11] Two pipes will be 20" diameter, PIP (Pipe in Pipe), double walled and with insulation to transport refrigerated propane and butane; one 24" diameter to transport gasoline; and one 10" diameter to transport diesel fuel.

[12] Granular sediments are found up to 1,500 m from the coastline.

[13] Beyond 1,500 m from the coastline the granular sediments are covered by a layer of fine sediments varying from 1 m to 10 m.

from the tugboat for the plow was also modeled. The criteria (suspended solids concentration) selected for the modeling, based upon protection of biodiversity during construction, were established based upon distance from the center of dredging activities as: 500 mg/l for areas between 100 and 400 m, 100 mg/l for areas between 400 m and 1,000 m, and less than 10 mg/l for areas beyond 1,000 m.

5.42 According to the results of the mathematical modeling, the use of ecoclamshell, in all scenarios of winds and currents except one, had estimated concentrations of suspended solids between 200 and 350mg/l within the 100 m, below 100mg/l at 400 m, and below 10mg/l at 1,000 m. In the one exceptional case, the concentration of suspended solids would be 16mg/l beyond the 1,000 m point for the duration of 4 hours. For the use of a backhoe, the results of the mathematical model indicated that suspended solids concentrations dropped quickly and remained primarily in the area within 200 m, and within the established modeling criteria limits for suspended solids. With the use of a plow (without a tugboat), although the criteria for biodiversity protection at the 100 m and 400 m points were met for a few scenarios, the criteria at the 1,000 m point was not met in any of the 16 scenarios. The plow operation with a tugboat does not meet the criteria at either the 100 m, 400 m or 1,000 m points in any of the scenarios modeled.

5.43 Therefore, based upon the modeling results the method selected for dredging/trenching was a backhoe for granular materials (i.e., first 1,500 m from the shoreline) and an ecoclamshel for granular sediments and fine sediments (i.e, after 1,500 m from the shoreline). The granular material will be excavated using a conventional backhoe. For the first 600 meters from the shoreline the backhoe will operate from a mobile platform and beyond that from a barge. The excavated granular materials will be placed by the side of the trench to be used later for backfill.

5.44 In addition, during the construction of the loading platform, it was estimated that a small increase (approximately 1 to 3 trips per month) of maritime traffic is expected in relation to supply barges from and to San Martín Port where piles and other material will be stored. A series of construction barges will be used which will be kept in place and then moved using an extended mooring system. Anchor tugboats will be used to lift and move anchors at the edges of the mooring cables. The construction of the structures that will conform the loading platform will be previously done onshore, thus reducing the construction time and, by reducing the works in the water to a minimum, minimizing the potential environmental impacts.

Social

Gas Wells and Associated Facilities

5.45 The principal social impacts and risks associated with the construction activities in Block 88 include construction-related direct impacts such as noise, interference with households and community activities, or damage to the physical environment from which the community's welfare are dependent. Additionally, indirect socioeconomic and cultural impacts could result from potential increased migration in search of jobs. Most of the construction impacts are temporary and of limited duration (about 2 years), and can be mitigated with the use of good environmental and social management procedures during construction, such as noise control, treatment of wastewater and liquid effluents, and management of wastes, fuels and lubricants, and migration control, among others. Nevertheless, some impacts could be permanent and

irreversible. Such are potential social impacts on the indigenous people (Nahua-Kugapakori) living in voluntary isolation. Also relevant are impacts of air and fluvial transportation, impacts of easement of the ROW for the flowlines and other facilities, and the potential cultural changes in the traditional communities. These principal social impacts are summarized below.

5.46 Potential Impacts on Indigenous People (Nahua-Kugapakori) Living in Voluntary Isolation. This concern was more significant in relation to the seismic activities inside Block 88 (approximately 2/3 of Block 88 lies within the Nahua-Kugapakori area), which could have resulted in accidental contact with these indigenous people. This would entail a number of negative impacts, primarily the introduction of diseases unknown to these peoples, which could harm their physical integrity and survival. This impact was considered of great magnitude and importance, but given the mitigation measures put in place, the probability of occurrence was low. To minimize this risks, the original area of Block 88 to be surveyed by the 3-D seismic program was reduced to only 765 km^2 to exclude the basins of the Serjali River and the Bobinsana Creek, where information collected by the anthropological studies suggested the possibility of encounters with isolated groups within these areas. In addition, a Contingency Plan for Dealing with accidental contacts with indigenous peoples living in voluntary isolation was developed and implemented by Pluspetrol. (See Section 6 for details).

5.47 The seismic works were completed in October 2002. In two occasion encounters occurred but the procedures of the Contingency Plan were implemented and the indigenous peoples returned to their communities with no known further effect. Another encounter with a group of seven non-contacted indigenous occurred in August 2002, during seismic activities in seismic line 34, also with no known further effect.

5.48 In May 2003, following recommendations from IDB and other stakeholders, Pluspetrol discontinued all activities on the construction of the flowline to SM-3 (which falls within the Nahua-Kugapakori area) while a rapid social assessment of the area of Block 88 within the Nahua-Kugapakori area was performed (from May to June 2003) by two independent anthropologists hired by GOP under the IDB institutional strengthening public sector loan. Work was re-started subsequent to a positive report from the consultants and implementation of independent monitors in the reserve.

5.49 With regard to health impacts originating from the project, it has been difficult to establish a direct link between the current situation and the project's impacts. Since 2000, Pluspetrol has been supporting GOP's efforts to provide medical assistance to the Nanti communities of Montetoni and Marankiato. A recent (May 2003) report from Cusco's Regional Direction of Health on the health status of the settled and semi-settled communities is somehow disturbing. In the Marankiato communities (within the Nahua-Kugapakori area) an epidemic of acute respiratory syndrome occurred in April 2003 affecting 12 members and killing 3. The same respiratory syndrome affected approximately 40 members of the native community of Cashiriari. Nevertheless, systematic information on the health status of the population has only been available since 2001, as part of the monitoring system implemented by Cusco's Regional Direction of Health. Therefore, given the mitigation measures implemented by Pluspetrol (vaccination program and support to the Ministry of Health) and GOP (in particular the ELITE group of Cusco's Regional Direction of Health, which is responsible for the visits to the most remote communities that do not have regular health services), and given the previous lack of systematic monitoring of health status of the native communities in the Lower

Urubamba, it has not been possible to link the current health problems identified by the GOP to the Project's implementation.

5.50 Impacts of Air and Fluvial Transportation. Other potential significant social impacts during construction are related to aerial and fluvial transportation of personnel and materials (mainly through the Urubamba river). Transportation from Iquitos to Las Malvinas is critical, given that the Urubamba River is only navigable during approximately four months per year, from December to March, where the water levels are higher due to the rainy season. Approximately 53,000 tons of materials and equipments are to be transported. As of September 2003, approximately 43,000 tons had been received in Las Malvinas. Such a demand imposes particular concerns about increased risk of accidents between the large barges and boats used by the Project and the small boats used by the communities (given that the Urubamba River is the main via of communication in the area), and the potential social conflicts between Project personnel and local communities. In spite of the Fluvial Transportation Plan that was developed and implemented by Pluspetrol to mitigate these impacts, a fatal accident involving a local Kirigueti community girl occurred. Pluspetrol promptly assumed the responsibility and compensated the family, regardless of the results of the investigation[14]. One fuel spill of 4,500 gallons of jet-fuel has been reported in the Urubamba River, in September 2002. A barge on the way from Nuevo Mundo to La Peruanita base ended up beached on the shores of the Urubamba River.

5.51 An additional concern relates to the noise and movement of barges and motorboats, which could affect fishing in the rivers. There has been no evidence of significant impacts of the project transportation in the fishing activities in the Urubamba River.

5.52 Easement of ROW and Facility Areas (Compensation). Compensation agreements were signed by Pluspetrol for the use of lands and its natural resources. Compensation is provided for 7 native communities directly affected by the operations carried out in their lands, and to 22 native communities indirectly affected by potential impacts related to river and air transportation. In May 2001 a 3-year agreement was signed with the Community of Nuevo Mundo for the use of 42 ha, where the logistic base of the Project is now installed. This agreement includes a communal development fund to implement a U$180,000 community development program, which was developed by the community with the assistance of the NGO Pro-Naturaleza. Other agreements were signed with the communities of Camisea for the flowlines; Segakiato, for flowlines and seismic; Shivankoreni, for seismic; and Chokoriari, also for seismic, all of which include a communal development fund in the total of approximately U$550 thousand. For the year 2002 these agreements correspond to the easements required for the construction infrastructures of the flowlines and the 3-D seismic survey.

5.53 During the IDB Public Consultation Program implemented as part of the IDB environmental and social due-diligence, a number of issues in relation to compensation were raised. The majority of them were related to: (i) a lack of clear understanding of the compensation procedures, particularly with regards to the unforeseen impacts, which will be compensated at the end of construction (discontentment led some communities to stop the machinery at the

[14] Subsequent accident investigation was inconclusive with regard to Pluspetrol 's responsibility.

work fronts); and (ii) inconsistent compensation criteria (in some cases the values defined by CONATA were used (minimum value), whereas in other opportunities better prices were negotiated. In one case a legal suit was filed against Pluspetrol by the Farmers Association of Las Malvinas (*Colonos de Las Malvinas)*, who claimed that the prices paid were unfair and requested a review of the contracts[15].

5.54 Cultural Changes. Although culture is considered to be a dynamic element in constant change that will continue its path even without the presence of the project in the area, the implementation of the project might accelerate or encourage cultural changes, such as changes in family cohesion and community, and degree of adherence to traditional lifestyles. The project could accelerate a process of change through: the creation of local development expectations; the provision of work only for some and not for all, leading to accumulation of capital; increased communal work for women due to prolonged absence of the heads of families; and the increase in interrelations and possible marriages between local women and workmen or migrant populations. Mitigation of these impacts was addressed by Pluspetrol in the Community Relations Plan (see Section 6 for details) particularly in the program for hiring local workforce, the workers' Code of Conduct, the regulations for fluvial transportation, the health manual for contractors, and the safety plan, all of which are being implemented by all Project personnel, including all contractors and subcontractors. In spite of that, incidents have been reported and in few cases workers have been fired for not complying with the Code of Conduct.

5.55 Potential Impacts from Increased Migration. The project does not contemplate construction of roads in the area, thus avoids the typical social impacts associated with new roads. There is a temporary access between Las Malvinas and the four platforms during the construction phase of the flowlines that is controlled until reforesting will be finalized and the forest will be regenerated.

Fractionation Plant and Marine Terminal

5.56 The majority of the negative impacts from the construction phase of the fractionation plant and marine terminal are related to the environment, given that there are no communities adjacent or nearby the plant site. The few potential negative social impacts during construction are related to impacts of increased road and maritime transportation and associated impacts, and potential impacts of the direct access from the Pan-Americana road to the Plant site. However, this road is still undergoing routing studies, as to minimize such impacts. During construction, both road heavy traffic and sea traffic will increase, given that most of the materials and equipment will be unloaded in the Port of San Martín, and then transported along 30 km by land to the Plant site. Increased road heavy traffic between the San Martín Port and the project site through the Paracas Reserve is estimated at 2-3 trips per month during the 18-month construction period. Therefore, the deterioration of road conditions by heavy traffic is expected to be minor and can be mitigated. Shipping traffic is only estimated to increase slightly in San Martín, from 1-3 additional ships per month during

[15] According to Pluspetrol, the Court did not proceed with the legal claim, given that it was not found to be consistent.

construction, thus considered a minor impact only, given the current shipping traffic in the Paracas Bay.

5.57 As to potential impacts of increased maritime traffic on the existing fisheries, including potential accidents, it is likely to be of small magnitude and significance, given the small incremental maritime traffic increase (1-3 additional ships per month). Social impacts associated with workers accommodations and campsites are not envisaged, given that workers will be recruited from the nearby communities of San Andres, Pisco and Ica, and there will be no workers' accommodations at the site.

Health and Safety

Gas Wells and Associated Facilities

5.58 The principal occupational health and safety impacts during the Upstream construction are very similar to those associated with the construction of the pipelines in the Downstream component, and are summarized in section 5.1.1. Well drilling is inherently dangerous because of the heavy machinery and loads involved (steel pipes, cranes, tanks, drilling rods and cables).

5.59 Fluvial, road and aerial transportation are a source of safety hazards to the project personnel and to the communities. Boats or canoes capsizing due to waves from boats or barges used to transport construction materials, collision between project barges and small boats and canoes, and subsequent fires or explosions are some of the risks identified and that were addressed by the fluvial and aerial transportation procedures developed for the Project. Helicopter flight failures during takeoff or landing or while in flight are a risk, particularly in remote areas, which could be exacerbated if occurring over communities or around the camp areas. Nevertheless, risks of a flight-related incident are minimal with qualified pilots, well conceived landing and takeoff procedures, and good airship maintenance.

Fractionation Plant and Marine Terminal

5.60 In relation to the construction of the fractionation plant and marine terminal, given the sandy nature of the proposed fractionation plant site, dust and emissions may have temporary occupational health impacts, if workers are not using the appropriate protection equipment. Additional risks are related to the construction of the submarine piping and loading facilities (located at 3.2 km from the cost). Potential risks associated with the increased road and maritime traffic are also present, but of small magnitude, given the small increase in the existing traffic (Refer to paragraph 5.52). The majority of the safety hazards is temporary and can be mitigated with the occupational health and safety policy, plans and procedures developed and implemented by Pluspetrol.

5.1.3 Distribution Component

5.61 The principal potential impacts during construction of the Distribution component are related to the social disturbance to local communities, given that the distribution network crosses primarily urban areas with industrial and commercial uses. Erosion and sedimentation are not relevant, due to a number of factors such as the limited amount of rainfall in Lima (600 mm maximum rainfall in the Rimac basin), the fact that the pipes are installed in paved roads, and that the three river crossings (Lurín, Rimac and Chillón) will be done either in dry and/or stony riverbeds. When compared with the social aspects, the environmental aspects (e.g. water

resources, flora and fauna), are not relevant in the project's area of influence, including in the district of Lurín, located in the south of Lima, where some remaining farmlands exists but are rapidly developing into urban and industrial areas.

5.62 The principal social disturbances to the communities along the pipes network include inconveniences and nuisances from increased dust and noise from excavation activities, filling, operation of vehicles, machinery, and energy generators. These impacts are considered to be of small magnitude and significance, given the current level of air and noise emissions from congested traffic in the area. Other temporary impacts are associated with interruption of public services such as water and energy, disruption to traffic flows, traffic congestions, and economic losses due to interruption of accesses to business. All the potential impacts from construction are temporary and can be mitigated with the use of appropriate environmental and social management procedures during construction. In areas where construction is finalized, the IDB observed that rehabilitation is completed and the streets and sidewalks have returned to their original conditions. In the district of Lurín, where rural activities still exist, the pipes crossed 10 private properties where agricultural activities were developed (approximately 20 meters by 2 kilometers long). In those areas where construction is finalized, rehabilitation is now completed and affected farmers have resumed their agricultural activities.

5.63 A number of critical areas of incidence of potential social impacts were identified based on the existing urban congestion and density. These are the existing Market *Mercado San Juan*, the area of the new Central Market, and the *Porcino* Park adjacent to River Chillon, among the principal. The Pachacamac sanctuary in the *Valle de Lurin* , that was affected by the original routing, has been avoided by the re-routing that avoids the "intangible area" and also avoids the historical center of Lima (by using the 6-lanes by-pass (e*vitamiento)* highway throughout the whole area).

5.64 The principal occupational health and safety risks are related to excavation of trenches, welding, and operation of equipment and machinery, which are common to this type of civil works and for which standard occupational health and safety procedures already exist. Falls, burns, cuts, and exposure to radiation (during quality control) are some of these risks. Traffic accidents involving workers and pedestrian are additional risks due to the fact that the project is developed in an urban area where traffic is intense and congested. Nevertheless, in areas where construction is either completed or underway, the implementation of adequate safety measures has been effective and no accidents have been reported.

5.2 Operation

5.2.1 Downstream Component

Direct Impacts

5.65 Direct impacts from pipelines' operations are significantly smaller than those at construction phase and principally associated with the risks of accidents in the pipelines and stations (spills). Nevertheless, given that the pipelines are buried along the entire route (with the exception of the aerial crossing of the Comerciato River), and given the SCADA supervision and monitoring system put in place, this probability is considered to be low (See Section 2 for details).

5.66 The maximum volume of spilled NGL assumes that one of the shut-off valves fails and the content of the pipeline between the other valve and the nearest high point leaks out. In the most conservative case, the volume spilled would be equal to the volume contained in the pipeline between two automatic shut-off valves, or approximately 2,800 m^3. When depressurized, the NGL will partially vaporize, producing NGL vapors. While the volume vaporized depends on the initial temperature and atmospheric pressure, based upon local conditions, as much as 37 percent could vaporize in the rainforest and coastal zones and approximately 25 percent in the Andes area. This vaporization could form a vapor cloud, which would dissipate in the area around the pipeline. Subsequent vaporization due to exposure of the NGL to the environment is very low in comparison. The remaining NGL will be absorbed into the soil or dispersed in the air. The potential for explosion is highly variable, requiring some form of ignition, with the primary sources being at pumping and/or pressure reducing stations. If an NGL spill were to reach a water body, the NGL would likely flout due to its specific gravity.

5.67 An accidental discharge of NG could produce an explosive air/natural gas mixture, but given that NG is light, an explosion is unlikely to occur in the open, as it would disperse quickly. An internal explosion in the pipeline is not possible.

5.68 However, if a spill or release did occur it could have significant secondary environmental and social impacts, particularly in areas of primary rain forest, adjacent to rivers and waterways, in sensitive areas at other locations, such as areas with natural resources used by communities. These impacts include potential contamination of drinking water in the rainforest and highland regions, as a result of a NGL pipeline leak or rupture (NGL typically contain benzene, xylene, toluene and ethyl benzene and hexane, all of which can be very harmful if ingested), soil contamination affecting agriculture and cattle breading activities, and impacts on vegetation.

5.69 Other direct impacts from the Downstream operations are associated with vegetation trimming along the ROW and potential air pollution by NOx, CO and particulate emissions from the compressor and pumping stations. Fugitive emissions of volatile compounds (VOC) from the NGL system may also occur from pump seals and pig launchers and receivers when they are in operation. These impacts are likely to be minimal due to the burning of natural gas to power these facilities in both pipeline systems.

Indirect Impacts

5.70 The potential environmental and social indirect impacts of the Downstream component could be significant, if the appropriate mitigation measures are not implemented (see Section 6 for details). Given that during the first years of post-construction, revegetation and recovery of the ROW and of other areas cleared for construction will be in the early stage, it will be attractive to settlers from other areas to use the ROW as a means to access the Lower Urubamba area, for settlement and agricultural development, thus posing a significant threat to both the biodiversity of the region (in particular in the Vilcabamba area, and the Machiguenga Sanctuary) and existing indigenous communities. In addition, if not properly mitigated, the uncontrolled migration could lead to unplanned development in the areas of influence of the pipelines, and to potential significant conflicts between indigenous and local communities and foreign settlers, particularly with respect of land property and cultural values. In order to mitigate these impacts TGP developed a migration control strategy that has been implemented since the early stages of project design and construction. The strategy also includes measures

to be implemented during the pipeline operational phase (See Section 6 for details on the migration control strategy).

5.2.2 Upstream Component

Direct Impacts

5.71 The principal direct potential impacts due to operations of the gas fields and associated facilities are contamination of water and soils (with industrial and sanitary effluents), flare and light impacts, air and noise emissions. These impacts are all likely to be of small magnitude, localized within the facilities area, and mitigable with the use of appropriate environmental management procedures.

5.72 Risks of accidents, such as failures and ruptures in the flowlines can potentially result in spills, fires and explosions, which in turn could have significant environmental and social impacts, such as reduction of biodiversity, contamination of water resources and soil contamination.

5.73 For the fractionation plant and marine terminal, the main concerns in relation to direct impacts is the potential contamination (and associated secondary impacts, such as loss of biodiversity and economic losses in the fisheries industry) of the Paracas Bay and coastal areas of the Paracas National Reserve in case of accidents involving the transport, and loading and unloading activities of propane, butane, diesel, naphtha and jet fuel. Pluspetrol is developing a detailed mathematical dispersion model for the Paracas Bay and the area of influence of the terminal, which is expected to provide reasonably accurate information on the potential impacts of approximately 16 risk-scenarios, including the worst-case scenario, which will then allow for the development of a detailed set of mitigation measures, including a revised Contingency Plan and Emergency Response Plan. This information will be available prior to starting operations. Different spill-scenarios are being mathematically modeled to assess the potential behavior of the spill plume in case of spill of any of the products to be loaded at the marine terminal. The Spill Analysis model MIKE 21 SA from the Danish Hydraulic Institute is used to simulate the spill and the following progress at sea. This model operates with the MIKE 21 PA (Particle), of the same family of models. Both models are broadly used to model contingency scenarios associated with hydrocarbon spills. Both models use the hydrodynamic scenarios modeled with MIKE 21 HD. Input data to the models include winds, currents and tides, bathymetry, water temperature, salinity, atmospheric properties, and products characteristics, among others.

5.74 Forty five spill simulations with the MIKE 21 SA are being modeled for the platform zone, considering three different spill volumes: 16 m^3, 795 m^3 and 1500 m^3 (Environmental Guide for Off-shore Oil Operations from the General Bureau of Environmental Affairs, Peruvian Energy and Mines Ministry), with associated time intervals of 1, 6 and 24 hours, respectively. For each scenario, the following information is being estimated:

(i) Spot size: the maximum area (in hectares) the spill can have, how long after the occurrence of the spill it takes place and its duration;
(ii) Spot thickness or density: The maximum thickness (in centimeters) that a spill can have and how long after the occurrence of the spill it takes place;

(iii) Emulsification: The maximum amount of water (in centimeters) within the spot has been calculated and how long after the occurrence of the spill this maximum takes place;
(iv) Accumulated Evaporation: The evaporated volume accumulated after the first, second and third day of the occurrence of the spill;
(v) Direction of the product plume: estimation of the main direction of the spot after several hours of occurrence of the spill;
(vi) Spill destination: The approximate zone of arrival;
(vii) Approximate speed: The spill directions and speed due to a combination of wind and tide; and
(viii) Crucial Time: The time (in hours) that will take for the spill spot to get to or near the shoreline.

Indirect impacts

5.75 The most significant potential indirect impacts associated with the operations of the Upstream Component would be the potential increase in extractive activities (oil and gas, illegal logging and legal forestry) in the Lower Urubamba, in particular in the area reserved by the State for the benefit of the Nahua-Kugapakori. These activities, if not properly controlled, could significantly reduce the biodiversity in the region and introduce a number of diseases, which could threat the physical, social and cultural integrity and survival of indigenous people.

5.76 In addition, the ROW of the flowlines, if not properly restored and controlled, can provide access for unmanaged and illegal incursions and settlements into the Nahua-Kugapakori reserved areas. This could lead to conflicts between indigenous and local communities and foreign settlers.

5.77 In relation to the indirect impacts of the operational phase of the fractionation plant and marine terminal, the most relevant are the potential negative impacts in the urban and regional development of the Pisco area, particularly if other industrial facilities which operations are not compatible with the protection of the Paracas Bay and the Paracas National Reserve are attracted to the area.

5.2.3 Distribution Component

5.78 The principal negative direct potential impacts of the operational phase of the Distribution component are related to the risks of accidents during operations and maintenance, such as gas leaks, explosions and fires. These risks are considered to be of low probability due to the current engineering standards for pipelines construction and to the supervision and control system implemented by the company.

5.79 Potential indirect negative impacts are associated with the induced industrial development that could be generated due to the availability of a less expensive source of energy in Lima and Callao, and potentially in Ayacucho and other areas along the pipelines' row, where natural gas can be available in the future. This could have secondary negative impacts in the water and air quality, increased soil contamination and noise emissions, in case an appropriate environmental regulatory framework and environmental (ambient and emissions) standards is not enforced.

5.3 Positive Impacts

5.80 The Camisea Project is a chief component of the Government of Peru's energy policy, given that its reserves are ten times greater than the current proven reserves in the country. The Camisea Project will represent an important transformation in the energy system in Peru, as it will make gas available to the area with the largest industrial and commercial consumption in the country. Natural gas is the most viable energy source for industry and its main market is the electric energy generation. NGL will supply the local market and will also be used for export, directly impacting the commercial balance in Peru.

5.81 During the construction period, the principal positive impacts are the provision of employment and improved national and regional economies. The Camisea Project has already created over 6,000 direct (contractors and subcontractors). Approximately US$1 billion has already been invested as of June 2003, with over US$654 million in purchase of goods and services from Peruvian suppliers, thereby adding approximately 0.6% to Peruvian annual GDP during construction, exclusive of any indirect or multiplier effects.

5.82 During operations, natural gas liquids will supply the domestic market and also will be a significant source of foreign currency earnings. Peru's balance of payments is expected to improve as a result of liquid exports and imports substitution. Camisea will also generate direct fiscal benefits for the Peruvian government through corporate income tax and royalties. The government will receive royalties equivalent to 37.24% of the Upstream Component gross revenues (estimated to be US$68.2 million in 2005, with an annual average of US$105.7 million from 2005 through 2015; a significant amount when compared to the Peruvian government's annual budget of US$9.8 billion for 2002).

5.83 At a regional level, the principal economic benefits from the Camisea Project will be directed to the Regional Government of the Department of Cusco (where the Camisea field is located), which will receive substantial revenues under a royalty-sharing scheme with the central government.

5.84 The substitution of more expensive fuels like diesel and residual oil for natural gas is expected to reduce system wide marginal generation costs, resulting in annual average savings of approximately US$365 million for electricity users. Estimated savings for industrial users of natural gas are US$250 million annually[16], mainly in energy-intensive industries such as cement and steel. The conversion of automobile engines from gasoline fuel to compressed natural gas may add an additional US$120 million[17] by reducing energy costs. The present value of energy costs savings is estimated at US$5.2 billion[18], or approximately 10% of Peru's 2001 GDP.

5.85 Forecasts show that the marginal cost of producing electricity with Camisea would be on average 30% lower than without Camisea over the concession period. Given the lower marginal cost of electricity generation and including the cost of transmission and distribution, the estimated final prices for households would be reduced on average by 10% for the first

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16 Average amount in the 2004-2015 period.

17 Average amount in the 2004-2015 period.

18 In net present value for the 2004-2033 period, at a 12% discount rate

ten years and on average by 6% over the concession period. The substitution of more expensive fuels like diesel and residual oil with natural gas is expected to reduce system-wide marginal generation costs, resulting in electric power generation savings of US$3,340 millions over the concession period. Other estimated savings from the substitution of more expensive fuels with gas have been estimated to reach US$642 million for industrial users[19], mainly in energy-intensive industries such as cement and steel. The conversion of automobile engines from gasoline fuel to compressed natural gas may add another US$30 million, and US$91 million could be further saved by households. Overall, the present value of energy costs savings is estimated at US$4.1 billion[20]. The Project is also expected to create a multiplier effect across the Peruvian economy. Estimates indicate that the development of the Camisea project will increase output by approximately US$5.4 billion in net present value term during the operating phase. Furthermore, the development of Camisea, by reducing the need to import diesel for electricity generation and expanding the supply of hydrocarbon products for export, is expected to reduce the fuel trade deficit by almost US$500 million on average each year representing approximately US$3,205 in present value terms, strengthening Peru's balance of payments in the medium and long term.

5.86 The key environmental benefits will be the improvement of ambient air quality in industrial centers of Lima and Callao through the reduction of air emissions generated by fuel combustion, such as carbon monoxide (CO), nitrogen oxides (NOx), sulfur dioxides (SO_2), hydrocarbons (HC), and carbon dioxide (CO_2) gases. The project is estimated to reduce significantly the level of air pollution in Lima and Callao, by making available natural gas (clean low-cost source of energy) as a substitute to fuel-based combustion sources in a number of industrial facilities and electricity generation plants. This could have direct economic benefits to residential and industrial electricity end-users and improve the competitiveness of Peruvian industry, raising Peru's standard of living. In the medium to long-term, it is envisaged that natural gas will be used to fuel public transportation, thus increasing the positive impacts in the air quality.

5.87 Additional environmental and social benefits will arise from the improvement of the GOP's capacity to better manage environmental and social issues associated with future oil and gas and forestry sectors, as well as protection of the indigenous peoples, as result of the implementation of the IDB Public Sector Loan. The Camisea Project also contemplates an Environmental, Social and Economic Regional Development Fund that will be established using royalties from the Project and with contributions from the Project Companies. The fund will help promote equitable distribution of economic benefits raised by the Project to regions in the area of influence of the Project.

6.0 ENVIRONMENTAL, SOCIAL AND HEALTH AND SAFETY MANAGEMENT

6.1 The approach to the environmental, social, and health and safety management for the Camisea Project is to encompass the entire life of the project, from the concept and design

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[19] Average amount in the 2004-2015 period.

[20] In net present value for the 2004-2033 period, at a 12% discount rate

stages, through the construction of the facilities, and throughout the operational life of the project. The principal components of the environmental, social and health and safety management (ESHSM) for the Camisea Project, which are summarized in this Section, includes:

(i) Specific project design concepts and criteria to minimize potential environmental, social and health and safety impacts or risk (See Section 6.1);
(ii) Specific plans and procedures in order to adequately manage the environmental, social, health and safety risks and impacts of each component of the Camisea Project, during construction (See Section 6.2) and operation (See Section 6.3) ;
(iii) Specific programs to monitor and supervise the environmental, social and health and safety aspects of each component of the Project (See Section 6.4);
(iv) Designation of adequate resources to manage the environmental, social, and health and safety aspects of the Camisea Project (See Section 6.5).

6.2 In addition, the IDB has worked with the GOP since the early stages of the IDB's Environmental and Social Due-Diligence of the Camisea Project in order to enhance the existing institutional capacity of the various GOP entities involved with the Camisea Project. This relates to improving the supervision capacity and coordination among the applicable GOP agencies, addressing potential indirect long-term effects of the Project or issues that would require GOP (in comparison to private company) actions, and improving the distribution of Camisea Project benefits to local communities on an environmentally and socially appropriate manner. In this regard, the IDB worked with the GOP and approved a loan related to these areas (See Section 6.6 for details).

6.1 Environmental, Social and Health and Safety Project Design Criteria

6.3 The design of the Camisea Project includes various design criteria/components specifically intended to minimize potential environmental, social, and health and safety impacts and risks. Many of the design criteria were identified early in the project development cycle, while others reflect the results and recommendations of the public participation during the EIA development and approval process. Some of the public concerns were significant enough to lead to changes in the overall project concept and the location of facilities, such as pipelines and flowlines. Others have resulted in changes in the operational techniques and equipment used (like the type of drilling) and even the duration of certain operations including the seismic surveys. Examples of such design criteria are described below and include: minimizing land use and access roads, directional drilling of gas wells, reduction in seismic area, pipeline route selection, installation of large capacity pipeline (over initial demand) in rainforest area, limitation of right-of-way width and pipeline safety.

Minimizing Land Use and Access Roads

6.4 For the Camisea Project, environmental and social concerns were the reason for the "offshore in-land operation" approach, which maximizes air and river transportation using river barges and helicopters, in order to minimize potential impacts from ground transportation, land clearing and the creation of access routes to remote areas. For example, within the area of the wells, Block 88, this concept includes operating each well platform independently, with no access roads from populated areas.

6.5 One way to minimize land use and access routes is to use areas previously affected and to consolidate facilities at as few locations as possible. This concept was incorporated into the Upstream design by maximizing the use of areas previously cleared and graded by Shell, such as campsites in Nuevo Mundo and Malvinas and the existing San Martín 1, San Martín 3, Cashiriari 1 and Cashiriari 3 well pads. By using these existing areas, Pluspetrol minimized the need for additional clearing and grading of the well pads, gas separation plant and the flowlines. As a result of siting considerations, the impact on undisturbed areas was reduced to only 3km^2 of the total of Block 88 area of 1,435 km^2.

6.6 The same concept was also incorporated into the Upstream design by locating the production wells and the injection wells on the same well pad and the use of directional drilling. Directional drilling is a relatively new technology, which allows for drilling a cluster of wells a few feet from each other from the same well pad rather than clearing and grading a new position for each well. Once the drilling platform is set up, the associated infrastructure can be established and maintained for the duration of drilling and completion of all of the wells within the cluster. This reduces, both initially and in the future, the number of flowlines and the access roads necessary between wells. This minimizes the mobilization and demobilization of personnel and drilling rig and equipment and therefore, safety hazards of construction personnel will also decrease. Thus, no new additional well pads are needed (i.e, other than those already affected during Shell activities).

6.7 The original routing for the flowline from the Las Malvinas Plant to the San Martín 1 well site was modified upon a detailed survey and consultation with the Segakiato community because a portion of the route was running near the village. The re-route set the new flowline 2 km away from the community, thus decreasing the social and environmental impacts on the community.

6.8 The Downstream Component concept includes minimizing access roads in the rainforest areas. More than 90% of the length of the pipeline ROW will be used as a roadway during construction to avoid the need for new roads. In the Lower Urubamba area there is no road construction. In the Upper Urubamba, the Project is using three existing access roads that have been improved and only a small section of one of these roads to the Chimparina camp. In the highlands and coast sections, existing roads have been identified and improved, but no new roads have been constructed.

6.9 In order to minimize the need for any future construction activities and associated potential environmental and social impacts in the rainforest areas, the NG pipeline between the Las Malvinas and compressor station 3 (located in a sensitive rainforest area) is being installed with oversized capacity to allow for the transportation of additional volumes of gas to meet future gas demands. Added compression and/or the looping of the pipeline downstream of compressor station 3 can meet the additional system capacity. Similarly, the NGL pipeline is being built with the final design capacity of future estimated needs, although the initial capacity is about one third of the system's design. Therefore, any increase in the system capacity can be met just by adding additional pumping units at the four pump stations without the need for additional construction in the ROW.

6.10 In the Downstream component, the same concepts were adopted for the design and construction of helipads. Wherever possible, unloading zones, temporary camps and helipads were located in areas previously cleared on riverbanks or in natural clearings in the forest.

The maximum size of the helipads is 60 m x 40 m in areas already affected by man. In protected or sensitive areas, safety restrictions apply to flying operations. The maximum cleared area of advance camps (alongside the helipads) are 10 m x 10 m.

Reduction of Seismic Area

6.11 The original area of Block 88 (approximately 1,435 km^2) to be surveyed by the 3-D seismic program has undergone two reductions from the originally planned area (1,200 km^2). In August 2001, and based upon the results of the EIA, the area was reduced to around 800 km^2. This was to avoid risks concerning areas 10 km outside the eastern limit of the Block used by two native communities (Montetoni, Marankiato) living geographically isolated in the watersheds of the Camisea River. Subsequently, in May 2002, due to studies carried out by anthropologists from Pluspetrol and Veritas (contractor in charge of seismic works), which suggested the possibility of encounters with isolated groups within the Block, the seismic area was once again reduced to avoid the watersheds of the Serjali River and the Bobinsana Creek. The final area surveyed by the 3-D program was thus reduced to 765 km^2.

Pipeline Routing

6.12 In the Downstream component, the pipelines route was selected as to avoid sensitive natural and cultural features, while taking in consideration constructability requirements. For example, approximately 122 km of the 172 km of pipeline ROW in the rainforest section runs mainly through areas already disturbed and occupied by rural settlers. In addition to the main route and corresponding EIA, four alternative routings at selected sites were studied and the corresponding EIAs were developed and approved: (i) the Aendoshiari alternative, was proposed to avoid a Native Community and minimize impacts on un-impacted forests; (ii) the Pacobamba alternative, approximately 36.8 km-long through secondary forest and rural communities, was designed to avoid the primary forests between km 156+178 and 192+225 in the Chunchubamba river watershed; (iii) the Pisco River alternative, designed to minimize construction impacts, is 52.73 km long; and (iv) the Cañete alternative, which was designed to avoid a 19.5 km-long complex drainage system built by the Ministry of Agriculture. One other alternative has been proposed and is currently under evaluation by the Ministry of Energy and Mines. This is the Playa Lobería alternative, which connects the pipeline route with the proposed fractionation plant on the Peruvian coast (39.49 km long).

6.13A 156-km alternative route for the rainforest section was studied but not selected due to its potential environmental and social impacts. The alternative proposed by CEDIA (*Centro de Desarrollo para el Indígena Amazónico*) crossed through the *Pongo de Mainique*, an area considered to be sacred by the Machiguenga people and currently proposed by GOP to become a protected area (*Santuario Megantoni*) as part of the activities to be fulfilled under the IDB Public Sector Loan. Although it would affect primarily community legally titled lands, thus reducing the problems associated with easement of the ROW, it would require a large number of access roads during construction, which could become access routes for uncontrolled migration into the former Apurímac Reserved Zone. Impacts of this alternative on primary forests and isolated communities were also assessed as more significant than the alternative currently implemented.

Right-of-way Width

6.14 In the Downstream component, TGP limited the average width of the right-of-way (ROW) to 25 meters, which allows for both efficient deployment of a cross-country ("mainline") spread and avoids "pinch points" that present safety and logistical problems and impede construction progress. The use of a mainline spread maximizes pipeline production and thereby reduces the construction duration, which is animportant factor in determining the magnitude of environmental and social impact. In sensitive areas that cannot be avoided, the nominal right-of-way width has been reduced to 20 meters, in some case to 12 meters, in an attempt to limit the amount of disturbance. Nevertheless, at steep slopes, side slopes, or rock, additional ROW width (extra workspace) is needed to stockpile additional volumes of excavated soil and rock. Also at roadway and water-body crossings, additional workspace is required to provide a staging / layout area for pipe and equipment, as well as to provide additional space to stockpile larger volumes of excavated trench spoil to accommodate the increased depth-of-cover requirements for these locations.

Pipeline Safety

6.15 The pipelines will be entirely buried, with the exception of the aerial crossing of Comerciato River. The pipeline design also incorporates state-of-the-art safety measures such as external cladding, cathodic protection against corrosion and specific safety protection systems such as the SCADA (Supervisory, Control, and Data Acquisition System) that will permanently monitor the pressure and temperature of the fluids inside the pipeline and activate the shut-off valves when it detects a pressure drop, which could indicate a possible leak. Additional pipeline safety will be ensured by closing the pipeline ROW and by implementing an appropriate Contingency Plan, which will address all potential risks associated with the pipeline and associated facilities (e.g., pump and pressure regulation stations), including the potential for terrorists attacks.

6.2 Environmental, Social and Health and Safety Management During Construction

6.16 This sub-section presents a summary of the environmental, social and health and safety plans and procedures for the construction phase of each component of the Camisea Project. These plans were initially developed as part of the EIA approval process, and have been subsequently modified and enhanced to reflect detailed field procedures used by contractors, results during the implementation of the plans and procedures during construction (e.g., feedback from performance and supervision of construction), and recommendations and suggestions provided by the IDB (as part of its due-diligence), local communities and organizations, and local and international non-governmental organizations. Compliance with these plans is required for all contractors and sub-contractors and is being monitored by the companies themselves, company independent monitors, community monitors, GOP monitors, and IDB environmental and social monitors (see Section 6.4 for details).

6.17 A summary description of the construction phase environmental, social and health and safety plans for the Upstream, Downstream, and Distribution Components is presented in sub-sections 6.2.1, 6.2.2 and 6.2.3, respectively. Within each sub-section, the summary is divided into: managing environmental issues, managing social issues, managing health and safety issues, and managing contingencies.

6.2.1 Upstream Component

6.18 The summaries of plans and procedures for managing environmental, social, and health and safety and contingency issues with the construction of the Upstream Component are divided into: (i) gas wells and associated facilities, which includes the seismic activities, wells, flow-lines, and gas processing plant at Las Malvinas, and (ii) the fractionation plant and marine terminal. The relevant plans and procedures for the gas wells and associated facilities have been finalized and are being implemented. The conceptual design and principles for the plans and procedures for the construction of the fractionation plant and marine terminal have been identified as part of the EIA and associated studies/documents, and are being finalized based upon the results of the supplemental studies and information requested by the GOP as part of its consideration of the EIA.

Managing Environmental Issues

Gas Wells and Associated Facilities

6.19 The Environmental Management Plan (EMP) for the gas field and associated facilities contains a section on prevention and mitigation measures that are common to all the Upstream sub-components (seismic, well construction and operation, gas processing plant in Las Malvinas, and flowlines), and specific prevention and mitigation measures particular to each sub-component.

6.20 The environmental prevention and mitigation measures that are common to all Upstream sub-components are related to: training and management of personnel; general guidelines for the maintenance of access roads, clearing and leveling of the ground, construction of platforms and plateaus, and sites for installation of equipment; plans to manage solid wastes and oily residues; general erosion control measures; management, transportation, and storage of fuels and lubricants; management of wastewaters and liquid effluents; plans to preserve archeological remains; specifications for decommissioning activities; revegetation plans; occupational health and safety procedures: prevention, control and contention of spills; and emergency response and training. The more relevant components of the EMP are summarized below.

6.21 Protection of Biodiversity: General and specific guidelines have been developed to mitigate and minimize impacts on biodiversity and sensitive species. Examples of preventive measures include: (i) wherever possible, unloading zones, temporary camps, and helipads were located in areas previously cleared, on riverbanks or natural clearings in the forest; (ii) the maximum size of helipads is 60 by 40 meters in areas already affected; (iii) the maximum cleared area for advance camps (along the helipads) are 10 by 10 meters, and where helicopters are not required to land in the future, the drilling equipment has been dropped by air (e.g. seismic lines); (iv) only temporary camps were used for seismic crews and are still in use for construction workers; (v) temporary construction camps should not be located in sensitive

areas such as native communities or areas critical for local fauna (nesting grounds and breeding areas) and these campsites will be dismantled and reclaimed; and (vi) plants and animals not native to the ecosystem surrounding the camps will not be introduced and the capture or removal of forest animals and plants is prohibited.

6.22 Biodiversity Monitoring: In order to monitor potential long-term changes and effects on biodiversity, a biodiversity monitoring program was initiated in March 2001 (see Section 6.4 for details).

6.23 Re-vegetation Program: This program includes the restoration or recovery of disturbed areas needing reforestation or vegetation regeneration practices. The species selected for re-vegetation are native plants existing in the area (e.g., selected seeds from the forests of Block 88).

6.24 Erosion Control: Erosion control measures were (and will be) implemented where land has been cleared of vegetation, such as in the San Martín 1 platform, and the ROWs for the flowlines between Las Malvinas camp and San Martín 1. An Erosion Control Management Plan has been developed and includes the management of the crushed stone quarries. Temporary and permanent erosion and sediment control measures include: installation of silt fence and straw bale barriers, slope breakers and runoff diversion channels (temporary and permanent), and drainage control structures (such as siphons, sump pump and channel/river diversion); excavation of retention/detention basins; preservation of vegetative buffer strips (minimum 5 meters width) at crossing areas; slope stabilization; and revegetation. Erosion control measures include immediate revegetation of areas when construction is completed. As part of the revegetation program, Pluspetrol has provided the native communities with the required training and material (e.g., seeds, pots, shovels) that allowed them to develop the plant nursery and sell the seedlings to Pluspetrol.

6.25 During clearing and grading, the EMP includes requirements such as: adherence to right-of-way boundaries and restricting activities to the approved workspaces; use of felled trees and logs to help stabilize the right-of-way (corduroy mats, cribbing, bridges); excess logs are cut and stockpiled for landowner use, while excess brush and branches are chipped or buried onsite; topsoil is striped and stockpiled; and appropriate erosion control and stabilization measures are installed where required.

6.26 Water body crossings are done during periods of low flow (or no flow), providing sufficient workspace to prepare the pipe and stockpile trench spoils, and initiating trenching only when the crossing line is ready to be installed. Similarly, complex crossing procedures that create longer in-stream disturbances are avoided.

6.27 Surface Water Contamination**:** The handling of chemicals and fuels are managed to avoid spills or accident that could endanger the quality of the waters. Fuel storage follows international requirements of contention basins, surface drainage and distance from surface waters. Specific procedures are also in place for loading and unloading of fuels from barges to the sites. These procedures include the presence of specially trained teams to contain any accidental spills. These procedures were reviewed and modified based upon two fuel spills in May and September in 2002. A few small spills in the campsites occurred that have been promptly mitigated and cleaned up, with no irreversible damages reported. One accident involving a barge loaded with 4,500 gallons of jet-fuel has been reported in the Urubamba

River, in September 2002. The barge on the way from Nuevo Mundo to La Peruanita base ended up on the shore of the Urubamba River. The Contingency Plan was implemented and the vast majority of the fuel was recovered by means of pumping it from the barge to fuel containers and then removing them to a safe area; approximately 118 gallons of fuel reached the river and were not recovered. Given the speed and flow of the river in the location, the estimated and observed impacts were stated to be negligible.

6.28 Drilling Muds and Waters: The drilling fluids being used for the Camisea Project are a water base drilling muds, such that all waste are easily treated and disposed. Chemicals used for mud preparation are non-toxic. The well pads are designed based on a minimal discharge process, with an objective to minimize water usage and solid and liquid discharges from the site into the environment. The drilling fluids treatment process consists of the following: (i) waste minimization through solids control system; (ii) reutilization and dewatering of excess drilling mud; and (iii) cuttings collection and bagging system.

6.29 The solids control system efficiently removes most drilled solids from the drilling mud as the well is drilled. This results in less dilution and less waste to dispose. The main reason to remove drilled solids from the system is to prevent drilling problems and reduce mud and environmental control cost. Excess mud from the active system is stored in metal tanks for as much reuse as is possible. Mud that cannot be reused is sent to the de-watering system, which separates the solids and water. The solids phase is disposed of with the rest of the drilled solids and the water used as dilution or to prepare new mud. The cuttings are transported by the auger system to the bagging area. Cuttings are put into biodegradable bags. Parts of them are used on slope maintenance activities for erosion control around the location. Material that is not longer required for erosion control is placed orderly in a specific designated area where final biodegradation will take place.

6.30 The feasibility of re-injecting drill cuttings was assessed, and cuttings will not be re-injected due to unsuitable subsurface geological conditions, well construction and formation properties.

6.31 The fluids produced from the drilling process are handled as follows: runoff includes water from inner and outer ditch collection system; the inner ditch system around the drilling rig collects rainwater and wash water in the rig area. This water goes through an oil skimmer and is sent to the Australian[21] tanks for treatment; the outer ditch system is constructed around the perimeter of the matted location area and transports any liquids between the inner and outer ditches to an oil skimmer; this water can be diverted to the water treatment system if necessary; and the water discharge system provides lines to several discharge points to be able to discharge treated water, complying with the Camisea water discharge standards (see Section 3).

6.32 Reclamation/Closure: In general, reclamation will involve the collection and removal of construction waste (cleanup), grading to restore original or engineered land contours (restoration), and seeding and planting of native vegetation to stabilize the restored right-of-way and other work areas (revegetation). Besides returning the land to its original use and function, the primary focus of reclamation will be to permanently stabilize disturbed soils to prevent future erosion and sediment transport. The reclamation plan features the following

[21] A large round-shaped metallic tank built by parts, which can be manufactured on site rapidly.

typical performance-based measures: replace and compact hill cuts; restore salvaged topsoil; restore drainage patterns; install permanent slope breakers and other drainage control measures; install geotextile materials and/or engineered stabilization structures; revegetate with species adapted to the project area; and monitoring and maintenance after reclamation is completed.

6.33 Fluvial and Aerial Transportation**:** Pluspetrol and TGP have implemented an integrated fluvial transportation program for the transportation of materials along the Urubamba River from Maldonadillo (extreme point north) to Las Malvinas (extreme point south). The Fluvial Transport Code establishes the routes and time in which barges navigate and regulations for operations and safety measures to protect local population. It includes among other requirements: (i) that all barges are escorted throughout the route between Maldonadillo and Las Malvinas, by smaller boats that carry a siren to clearly advise of the incoming convoy; (ii) transportation along the Urubamba river is limited from 6:00 AM to 6:00 PM; (iii) all barge crews are vaccinated against the most common diseases in the area including Yellow fever, Influenza, Hepatitis A and B, Rabies, Poliomyelitis, Diphtheria,; (iv) all barges are fumigated on a monthly basis and carry the fumigation certificate; (v) fuel transport barges carry the appropriate spill containment equipment (oil barriers and recover materials); (vi) barges' speed is controlled, particularly when navigating through populated centers of native communities and settlers' dwellings located on the bank of the Bajo Urubamba river; speed reduction also allows for noise reduction, thus minimizing impacts on human population and fauna; (vii) an appropriate waste collection system is implemented by the barge crew; and (viii) all barge crews are trained in emergency response. In addition, all barge crews must comply with the workers Code of Conduct with respect to the protection of the biodiversity, relations with the communities and alcohol restrictions.

6.34 As part of the fluvial transportation program, the supervision system includes independent, radio-interconnected river control checkpoints along the Urubamba River and the generation of daily reports with the location of all barges and water depths, which are sent to Lima and to Las Malvinas. To ensure its implementation, each checkpoint is responsible for a portion of 30 km of river to patrol. Each post has a speedboat, a radio transmitter and a five-member crew, and their duty is to ensure that transport barges and minor vessels comply with the rules, specially concerning, maximum speed, prohibition of contact with native communities, prohibition of hunting fishing or gathering fauna or flora, availability of spill prevention and control equipment like pumps and river booms, etc.

6.35 In August 2002 the Fluvial Transport Code was reviewed and enhanced with the collaboration of the Kirigueti community in response to the drowning of a young indigenous girl from that community, allegedly as a result of excessive speed by a boat associated with the Upstream Component. The enhancements made in August 2002 include: (i) two additional control point between the Peruanita base and the Kirigueti point (thus totaling nine radio-interconnected control/check points); (ii) control points in 37 communities, with the participation of locals from all communities; (iii) additional warning buoys upstream and downstream of each community; (iv) review of boat's identification numbers and names, as to make them easily identified from shore by the communities along the river; and (v) hired a River Transportation Supervision Company (T&S Cambero), with a team of four people in each of the river control posts. The Supervision Company reinforced Pluspetrol procedures, particularly regarding speed control, no mooring across populated areas; no contact with local communities; no traffic during night hours. In addition, Pluspetrol compensated the affected family.

Fractionation Plant and Marine Terminal

6.36 The proposed environmental procedures for the fractionation plant are described in the Environmental Management Plan (EMP) of the EIA. The measures proposed are general good practices outlined for construction works of this magnitude and type, and include: (i) environmental, health and safety training of personnel; (ii) general vehicle traffic guidelines; (iii) erosion control on earthworks and leveling; (iv) equipments and structures; (v) management of solid, liquids and hazardous wastes; (vi) management, transportation and storage of fuels and lubricants; (vii) noise control; (viii) air emissions control; and (ix) potable water management.

6.37 For the marine terminal, and in particular the dredging of sediments and undersea pipeline installation, the complete proposed environmental procedures are being finalized based upon the recently completed marine surveys (water quality, flora and fauna, and mathematical modeling of sediment planned due to proposed dredging).

6.38 In addition, to comply with a condition established in the Environmental Permit issued for the fractionation plant and IDB recommendations, Pluspetrol is developing complementary measures to address potential negative and cumulative impacts in the urban and regional development of the Paracas Bay area, such as studies to support the waste management and wastewater treatment, environmental education programs, and a Master Plan for the Paracas National Reserve.

Managing Social Issues

Gas Wells and Associated Facilities

6.39 The Community Relations Plan is the principal plan for managing social issues for the gas wells and associated facilities. This plan is based on the results of the social impact assessment (part of EIA) and the observations, suggestions and recommendations of the affected people expressed during the EIA consultation. Other actions and measures taken to mitigate social issues include: (i) second reduction to the seismic area in early 2002 in order to minimize potential impacts to indigenous persons not desiring contact within the Nahua-Kugapakori reserve; (ii) the temporary suspension/reduction in May 2003 of works in the Nahua-Kugapakori reserve (suspension of flowline work from SM-1 to SM-3 and reduction of works at SM-3), while at the request of IDB and other stakeholders an independent rapid social assessment and review of Pluspetrol's protocol was performed by two independent anthropologists hired by GOP under the IDB Institutional Strengthening public sector loan; (iiii) August and November 2002 reinforced training of contractors and subcontractors working in Block 88 in relation to Pluspetrol's policy and procedures associated with indigenous people not desiring contact; and (iv) measures being developed and implemented by GOP, as part of the IDB Institutional Strengthening public sector loan (see Section 6.6 for details).

6.40 The Community Relations Plan contains a series of programs to address specific social objectives, including: prevention against loss of forest cover and its resources (from which the local communities subsist); prevention against possible contamination of rivers and watersheds, which are a source of potable water to the local communities; control against fishing because of increased fluvial traffic; prevention against the introduction and spread of infectious diseases to local inhabitants; generation of employment; and prevention against loss

or change in the cultural integrity of the local communities living in the area of influence of the Upstream Component. The Community Relations Plan includes the following programs (with the primary programs described below): Contractual Agreements Program, Compensation and Indemnification Program, Social Contingency Program for Dealing with Isolated Communities, Program for Hiring Local Workforce and Workers' Code of Conduct, Personnel Training Program, Consultation and Communication Program for the EIA, Supervision and Control Program (Monitoring), and Management and Conflict Resolution Program.

6.41 Contractual Agreements Program: This program defines the principles and approach to negotiation with affected communities, focusing on the definition of each parties obligations, the establishment of temporary contracts, and the elaboration of signed agreements. The program incorporates a series of principles such as: (i) negotiations are carried with the community as a whole and before the Communal Assembly; (ii) each negotiation takes into account the characteristics of community organization, as well as its location and the specific impacts of the project; (iii) compensations must benefit the entire community; (iv) materials and goods delivered to the community as part of the compensation should not create dependability in the medium to long-term; (v) compensations should be oriented towards improving education, health, productive activities, and community's organizations; and (vi) the agreements must be adopted in Community Assemblies, with the presence of 2/3 of community members as a minimum, and must be legally notarized.

6.42 Compensation and Indemnification Program: This program involves the compensation to communities for use of land for project facilities and other potential impacts. The program is based upon common criteria, definition of areas of action (health, education, communications, productive activities, indigenous women, indigenous organizations, and regional development), and a formalized process.

6.43 Pluspetrol has signed agreements with all the applicable native communities with regards to compensation for both the permanent and the temporary use of land/property, use of forest, transit, pipeline right-of-way, and for the direct and indirect impacts caused as a result of construction activities on their territories. For example, for the community of Nuevo Mundo, the local development plan amounts to U$180 thousand. Another U$550 thousand approximately are related to local development plans for the communities of Segakiato, Shivankoreni, and Chokoriari. In addition, associated with those indigenous persons living in the Nahua-Kugapakori reserve, specific funds (e.g. approximately US$700,000) have been set aside for the construction compensation and will be available whenever a decision on how to compensate these groups is made. Compensation for project operation are still to be negotiated and finalized.

6.44 Social Contingency Program for Dealing with Isolated Communities: This program relates to dealing with those indigenous persons whom desire not to be contacted, living in the Nahua-Kugapakori reserved area, whom could be effected by the Upstream Component. The program included: the collection of social information (e.g., demography, settlements, culture, socio-cultural integration, etc.) related to indigenous peoples living in the reserve; determination of applicable national and international legal requirements and practices, including experts and intermediaries (stakeholders); and the development and application of preventive measures and sanitary controls for workers.

6.45 The risk of coming into contact with voluntarily isolated communities was considered a key issue in the area where seismic surveys were conducted. The project has developed two contingency plans related to possible contact with indigenous peoples, one for the whole project, and one specific to the seismic survey, given that this is the activity with the highest likelihood of contact with isolated indigenous peoples. In the seismic areas, an Anthropologic Contingency Plan was developed and implemented by Pluspetrol's Native Communities Department and Veritas' Community Relations and Indigenous Affairs unit. The Plan includes a series of steps to be followed in case of undesired contacts. All workers from the seismic crews were trained in the implementation of the procedures, which were also summarized in a booklet that was distributed to all workers. According to the plan, a team of anthropologists trained a group of native workers as guides and translators for Machiguenga, Nahua, and Nanty languages to act in the event of accidental contact. These workers were then distributed among various work groups (exploration, trail opening, seismic, and reforestation) operating in areas considered to be critical, principally the North-Eastern and South-Eastern ends of the seismic area, to act in the event of accidental contact. Also, given the fact that the mid-stream of the Camisea River, especially its main tributaries of the right bank (North) is occupied by several traditional Machiguenga families related to the Machiguenga inhabitants of the Segakiato native community, the Plan developed procedures to advise these families prior to start working in these areas. This procedure included a visit to these families by the natives guides and translators accompanied by natives from the Segakiato community that were relatives to the above mentioned families. In August 2002, on three occasions encounters with indigenous people in the reserved occurred but the procedures of the Contingency Plan were implemented and the indigenous peoples returned to their communities with no known further effect. The seismic activities terminated in October 2002.

6.46 Following IDB and other stakeholders' recommendations, Pluspetrol stopped work within the Nahua-Kugapakori area while the Company's procedures were reviewed by two independent experts hired by GOP under the IDB Public Sector Loan. By mid-June the experts issued their report, which considered that the protocols are adequate and recommended the works could be re-started.

6.47 With respect to control of health impacts on local and indigenous communities, Pluspetrol established supplies and basic emergency installations in the semi-isolated communities in order to assist health emergencies and epidemics that could occur, as well as developed a plan to detect the spreading of diseases from their initial stages. Special attention is given to malaria and leishmaniosis and their propagation vectors.

6.48 A vaccination program is obligatory for all the workmen and anyone visiting the campsites and working areas. An ample vaccination plan is carried out for each workman including but not restricted to the following diseases: Yellow fever, Tetanus, Hepatitis A, Hepatitis B, Diphtheria, Rabies, Grippe, Measles and Poliomyelitis, and Influenza, among others. Measures are taken to avoid interaction of the foreign workmen with the local communities during rest periods and vacations. Personnel are trained and informed of sanitary and health matters and of evacuation procedures in an emergency. Since 2000, a Memorandum of Understanding was signed between Pluspetrol and the Cusco Regional Direction of Health (of the Ministry of Health) regarding procedures to be adopted by Pluspetrol in assisting the *Red de Servicios de Salud La Convencion - Qillabamba* and *Microred de Servicios de Salud de Camisea y medicos itinerantes* to deliver health services to the native communities in the Lower

Urubamba. In addition, since November 2001, with the support of Pluspetrol, the Ministry of Health, through the Regional Direction of Cusco is implementing a systematic monitoring of the health status in the region. An epidemiological contingency plan is being developed with support from London's Institute of Tropical Medicine. In addition to the vaccination program, all the workers go through a medical check-up related to contagious diseases before starting to work. All cases of signs of malaria, leishmaniosis, dengue or other fevers are reported and documented.

6.49 In addition, as part of the GOP oversight, CONAPA, the National Commission for the Amazonian, Andean and Afroperuvian people (former SETAI, the Governmental technical bureau for indigenous affairs) has the responsibility to verify the implementation of the contingency plans, receive concerns and complaints from native communities, and ensure that their rights are not violated. The IDB included a specific component in the IDB Institutional Strengthening Public Sector Loan to expand the presence of the GOP in the area and to improve the existing institutional capacities of CONAPA. As part of the improvements made under the IDB public sector loan, CONAPA has launched a program of visiting the communities on a regular basis to receive input on how they perceive the Project's operation, its problems and impacts. The native communities also participate in the monitoring activities (see Section 6.5 for details). Pluspetrol has established a rapid channel of communication with the communities and the GOP, providing the communities in the area of direct impact of the project, including those in initial stage of contact, with radio communication to enable them to promptly communicate any potential negative event.

6.50 Program for Hiring Local Workforce*:* The implementation of this program takes into account the particular lifestyles of the indigenous population that inhabits the Lower Urubamba, so as to reduce the negative impacts arising mainly from the accelerated growth of a market economy, in an area mainly characterized by having an economy of subsistence. Pluspetrol's specific policy to contract unskilled indigenous labor include the following criteria and guidelines: (i) equal and non-discriminatory treatment between natives and non-natives and foreign workers (salaries, training and responsibilities); (ii) similar labor and salary benefits ("equal responsibility, equal salary"); (iii) rotation mechanism per native community and/or rural settlements; (iv) priority to contract local personnel from the native communities and/or rural settlements nearest to the work site of each of the main contractors; (v) vaccination of all local personnel according to the vaccination scheme proposed in the health manual for contractors; (vi) awareness raisin (*charlas de inducción*) lectures on safety, environmental, first aid and community matters provided to all locally contracted workers; (vii) provision of personal protection equipment, which must be adequate for the work to be performed by the worker and of quality and quantity equal to that granted to non-local personnel; and (viii) guaranteed adequate work and rest periods (a limit of 35 continuous working days must not be exceeded) for locally contracted personnel.

6.51 The program involves a participatory evaluation and selection process of native personnel done by the communities and a training module through the consulting firm *Pleno Ingeniería Social* . Training has been provided in a number of areas such as carpentry and masonry, as well as helper to civil works in general. The training was done in the town of Sepahua in agreement with the County District and the Dominican school and mission, for the use of their infrastructure and logistics support.

6.52 In order to reduce potential negative impacts arising from the implementation of the program, associated primarily with the use and flow of money among native communities and with the potential disregard for the family and community's responsibilities (e.g., delaying or not completing the seeding for the family's subsistence) a number of strategies have been implemented: (i) contracting of natives for limited time periods, ensuring the necessary rotation among inhabitants of different communities and distributing cash flow, thus reducing possible economic inequality; (ii) working with natives, both single and married, although preference will be given to the former, since married men have the family responsibility and the obligations to secure access to food; (iii) orient workers on the best use of their salaries, thus avoiding possible increase in alcoholism, family violence and even the rupture of family unity; (iv) education and training of the selected workers from the local population; and (v) orientation of workers regarding the best uses of their salaries.

6.53 Additionally, a Code of Conduct for workers was developed, including regulations for workers regarding contact with local people, specially women, as well as drinking, hunting, fishing and finding of archeological sites. The Company has implemented a "zero tolerance" for infractions and in a number of cases workers that did not comply have been dismissed from the job.

6.54 Personnel Training Program: The employees and contractors' training program includes training on environmental, health, safety and social issues related to native communities. The training is aimed at all employees and contractors participating in the project, and is delivered by instructors specifically hired by Pluspetrol. The concepts conveyed during initial training are reinforced in the field with daily chats and specific instruction programs.

6.55 Control and Prevention of Colonization: In order to reduce undesired immigration to a minimum during the construction period, Pluspetrol proposed not opening any new access to the upstream area. The launches, barges, airplanes and helicopters are not allowed to transport unauthorized passengers from outside the project. There is a temporary access between Las Malvinas and the four well platforms during the construction phase of the flowlines or pipelines in the field, which is controlled until reforesting has finished and the forest has reintegrated. Control comprises the coordinated action of the communities and Pluspetrol to the access of paths to the flowlines. Pluspetrol is supporting the training and communication of the communities to create a control system for their territories to quickly inform the presence of settlers, forest extractors and people foreign to the area.

6.56 Conflict Management and Solution Program: This program contains procedures to address potential conflicts and complaints, and includes: defining stakeholders and their characteristics, defining possible decision making and negotiation processes, and procedures to deal with social conflicts.

6.57 Consultation and Communications Plan: This program was designed with the following objectives: identify and involve the local population; establish communication and participation channels; identify the institutions (public and private) and organizations (national/regional/local); and establish contacts and held recurrent disclosure workshops during the preparation of the EIA.

Fractionation Plant and Marine Terminal

6.58 The Community Relations Plan for the fractionation plant comprises a set of programs to ensure adequate communication with affected communities, governmental authorities and other stakeholders throughout the life of the project. There are six principal programs, as described below.

6.59 Consultation and Communication Program, which includes a number of communication and consultation mechanisms such as meetings and information disclosure.

6.60 Program of Participatory Environmental Studies, which includes the participation of local communities in the preparation of the environmental studies and training of some community members as environmental monitors for the project implementation.

6.61 Local Employment Program, which includes the participation of local NGOs (to be selected in a biding process) to provide different services in relation to training and supervision.

6.62 Local Capacity Building Program, addressed at building capacity among the local population (fishermen, in particular). The program will be developed in association with academic institutions in relation to hydrocarbon and environmental management activities.

6.63 Special Studies Program, which encompasses a special research program on Environmental Management for the Area of the Paracas National Reserve and its area of influence (*Programa de Investigación de las Problemáticas Ambientales Actuales para el área de la RNP y zona de influencia del proyecto*). This program is developed within the framework of the Business & Biodiversity program of UICN, in which Pluspetrol is a partner. The study will result in an integrated approach to the social, economic and environmental development of the area, to be developed in a participatory way, with all stakeholders, local communities and governmental authorities. This program also includes: (i) an environmental education program; (ii) a participatory monitoring program; and (iii) an international and national marketing program in relation for the Paracas National Reserve and its ecological, cultural and tourist attractions.

Managing Health and Safety Issues

Gas Wells and Associated Facilities

6.64 Pluspetrol implements their corporate Occupational Health and Safety Policy as part of the occupational health and safety procedures specific to the Camisea Project. Pluspetrol's health and safety procedures address the types of risks associated with a project of this type and include training of personnel, monitoring and auditing the implementation of procedures, contractor's safety issues, communications with both local community and diverse employee nationalities, enforcement of rules and appropriate disciplinary action measures.

6.65 A Safety and Environmental Protection Manual was prepared and establishes the responsibilities and procedures to be followed by Pluspetrol´s personnel, contractors and subcontractors. This manual includes the following principal procedures: (i) training on safety issues; (ii) reducing risks to the lowest possible level consistent with the operations; (iii) accident/incident investigation and reporting procedures; and (iv) safe waste handling and disposal procedures. Additionally, by performing directional drilling, Pluspetrol minimizes safety hazards of construction personnel associated with multiple mobilization and

demobilization (the number of well pads that have to be cleared and graded are minimized, thus minimizing the number of flowlines and the access roads that have to be built between wells).

6.66 Pluspetrol has prepared a comprehensive training plan that covers training for employees, contractors, visitors and native communities. Training is implemented through a combination of initial training sessions with employees; general training meetings for employees, visitors and the native communities; specific training sessions (e.g. emergency response) for selected personnel; daily briefings for all construction personnel; supervisory sessions; and contractors' safety meetings. Health and safety supervisors conduct the training on a variety of topics including personal protective equipment, emergency response, industrial safety, environmental protection, preventive medicine and other topics.

Fractionation Plant and Marine Terminal

6.67 Pluspetrol is finalizing health and safety procedures for the construction of the fractionation plant. Specific procedures for the marine terminal will be finalized once the work has been approved and contractor defined. This will include dealing with dredging operations and marine works (e.g., pipeline installation).

Managing Contingencies

Gas Wells and Associated Facilities

6.68 The Contingency Plan and Spill Prevention, Control and Containment Plan (SPCCP) is designed to minimize any potential risks of accidental discharges reaching the soil or waters, during project construction. The SPCCP was customized by each contractor and subcontractor as per contractual clauses, to include: spill prevention and containment procedures; preparedness and prevention procedures; emergency response procedures; spill response procedures; provisions for specific training of workers in the SPCCP; and safety procedures. Also included in the plan is material inventory, secondary containment for all fuel/lubricants and other chemicals storage areas and storage tanks, sufficient and adequate absorbent materials and barriers, and firefighting equipment. The plan is being revised to address in more detail the risks associated with terrorist attacks during construction.

Fractionation Plant and Marine Terminal

6.69 The scope of the Contingency Plan for the fractionation plant includes: (i) administrative organization of the Company's response system; (ii) response structure and equipment; (iii) coordination with other plans; (iv) personnel, responsibilities and response time for each potential event; (v) training; and (vi) communications.

6.70 The specific Contingency Plan for the construction of the marine terminal will incorporate and expand the preliminary Contingency Plan included in the EIA. The Contingency Plan will address potential spills of hydrocarbons, oils and lubricants, including requirements that all vessels used during construction must be equipped with emergency containment and oils absorbent barriers, and that all oils, lubricants and other chemicals storage areas must be equipped with secondary containment with 110% capacity.

6.2.2 Downstream Component

6.71 The environmental, social and health and safety management plan for the construction phase of the Downstream component of the Camisea Project is organized in seven principal plans: (i) Environmental Prevention, Correction and Mitigation Plan; (ii) Community Relations Plan; (iii) Waste Management Plan; (iv) Environmental Training Plan; (v) Contingency Plan; (vi) Closure and Reclamation Plan; and (vi) Environmental Monitoring and Auditing Plan.

6.72 The principal plans are addressed in more detail in the sections below: managing environmental issues, managing social issues, managing health and safety issues, and managing contingencies. The Environmental Monitoring and Auditing Plan is addressed in section 6.3 - Monitoring and Supervision. The ESMP sets forth the requirements for the EPC contractor and the subcontractors to ensure that the construction (and operation) of the gas pipeline will be conducted with the minimum possible negative effects on environmental, cultural and socio-economic components in the area under the direct and indirect influence of the project, and to develop mitigation actions in the event that residual negative effects are experienced. The ESMP has been enhanced periodically to incorporate both the experience gained in the field with regard to effectiveness of environmental management procedures and IDB and other stakeholders' recommendations.

Managing Environmental Issues

6.73 Environmental Prevention, Correction, and/or Mitigation Plan*:* The Plan comprises a set of general regulations governing the prevention, correction and/or mitigation measures for the project and a set of detailed procedures for different stages and activities of construction phase, such as clearing, earthmoving, blasting, special crossings, pipe bending, closure and remediation of construction site, among the most relevant. Key principles of the plan include: training of all personnel (TGP, contractors and subcontractors); prohibition of collection of woodland flora and fauna, as well as of hunting, fishing and acquisition of live or preserved woodland animals and/or their skins; implementation of appropriate waste management in campsites and worker camps, in accordance with the waste management plan; implementation of suitable procedures for control of water contamination, including the use of appropriate methods for crossing permanent watercourses with vehicles, equipment and machinery; implementation of noise and dust control procedures; and implementation of the technical and environmental recommendations for river crossings. An erosion and sedimentation control, plan, a plan to manage archaeological remains and a fluvial and road transportation plan were also developed as part of the Environmental Prevention, Correction, and/or Mitigation Plan. Details of these plans are provided below.

6.74 *Erosion and Sedimentation Control Plan:* The Erosion and Sedimentation Control Plan was originally developed as part of the EIA and has been subsequently revised and significantly enhanced throughout the construction period in order to address the specificities and difficulties encountered and IDB recommendations. Given the topography, particularly in the rainforest area, effectively controlling erosion and sedimentation has been one of the biggest challenges for the Company. Both temporary and permanent erosion and sedimentation control measures have been implemented. TGP contracted an international erosion control expert to review the engineering designs, procedures, and execution dates of (permanent and temporary) measures to control erosion and sedimentation along the ROW and other work

sites of the project in order to minimize risks of environmental degradation. Global Forestry Consultants was hired to overview the efficiency and adequacy of the erosion control measures implemented. As a result, the time lag between grading and installation of erosion control measures was reduced as an erosion control crew was incorporated, a priority list of critical areas for installation of erosion and sedimentation control measures was generated, and additional erosion control supervisors were hired (particularly in Las Malvinas and Kepashiato areas, where the problems were more acute). Additionally, drainage control prior to earth movement activities were implemented in selected areas to help eliminate the lag time.

6.75 As part of the preparation of the ROW for the first rainy season of the construction period (approximately from December 2002 to March 2003), a specific erosion control plan was designed and implemented. The erosion control plan included temporary works on those areas where further construction activities will occur (e.g., ROW, temporary spoil sites, side casts, etc.) and permanent works on those areas where no further construction activities will take place (e.g. long fill slopes, final spoil sites, abandoned ROW).

6.76 A main focus of this specific erosion control program is from kp 80 to kp 140 (Chimpiarina to Segakiato) where narrow ridges, long and steep slopes and high levels of rain exist. The erosion control program identified the critical sites where erosion or slope instability are greater risks and which were assigned priority. A special task force was responsible for directly supervising the design and construction of all erosion control measures at critical locations. An initial crew of 500 workers and 30 machines was assigned to the erosion control crews. Nevertheless, it was found to be insufficient and in October 2002 over 600 workers and 60 machines were allocated to the erosion control crews.

6.77 Additionally, each of the specific operational procedures presented below incorporates erosion and sedimentation control measures, in compliance with the Erosion and Sedimentation Control Plan. Among the environmental operational procedures specific to the construction process, the most relevant in relation to potential erosion and sedimentation are: (i) installation of camps and workshops; (ii) clearing and grading; (iii) opening of access roads; (iv) variants to the existing right-of-way; (v) transport of fuel and inputs; (vi) river crossings, bridges, and other infrastructure work; (vii) earth movements; (viii) blasting; (ix) openings through ecologically sensitive areas; and (x) discovery of archaeological remains of cultural and historic patrimony of archaeological importance.

6.78 *Installation of Campsites:* As a general rule, only temporary camps are being used for the construction workers and these will be dismantled after the construction is finished. Additionally, a set of criteria was established for the selection of the campsites locations. These include: camps would not be built on steep slopes or where there is a potential risk of erosion or instability; camps would be adapted to the natural contours of the land, to avoid excessive earth moving; and camps would not be located in sensitive areas, such as native communities or areas critical to local fauna (nesting and breeding areas) and flora. Another general set of rules apply to the operation and management of the campsites, including: plants or animals not native to the ecosystems surrounding the camps cannot be introduced, and the capture or removal of forest animals and plants is prohibited; adequate systems for the collection, treatment and disposal of solid and recyclable organic waste, waste water from bathrooms, kitchen and laundry must be installed in accordance with the water management policy established in the waste management plan; and industrial waste, such as oily water

from workshops and stores, used oil deriving from the replacement of defective parts must be handled by adequate systems for collection, treatment and disposal in accordance with the waste management policy established in the waste management plan.

6.79 *Clearing and Grading:* The clearing procedures used by TGP include adherence to ROW boundaries, restricting activities to the approved workspaces, proper felling of trees, proper disposal of vegetation wastes, use of felled trees and logs to stabilize the ROW (e.g., corduroy mats, cribbing, and bridges), use of excess logs by landowners, and burn, chipping and burial of excess brush and branches onsite. Other detailed procedures include: clearing only using machetes and chainsaws; bulldozers not to be used for trees with a diameter at chest height greater than 20 cm; inclined trees that pose a risk to the safety of personnel and that may cause other trees to fall and/or endanger the pipeline are to be felled and placed on one side of the ditch (before being buried); materials unsuitable for construction are to be piled temporarily in specified areas and scattered over the surface of the embankments, clearings and other areas that require protection; felled material must be removed from the right-of-way by hand or using a backhoe or other means to contain the fallen material; the temporary collection sites must be sufficiently far apart to prevent the spread of fire in dried piles of timber. Stockpiled timber must be classified by size and diameter; trees off the right-of-way may not be felled to provide construction timber. If additional timber is needed it shall be acquired from authorized sawmills.

6.80 *Opening of Access Roads:* Work in the Lower Urubamba area does not include any road construction. The project has improved three existing access roads to reach the upper Urubamba, and built a small road extension in one of them. In the coastal and highland areas, the project has improved existing roads and when necessary only temporary access roads have been built. At the end of the construction phase, the temporary access roads will be incorporated into the closure and abandonment plan. In the highlands and coastal section, existing roads are identified and improved as the project advances. The existing roads belong to local farming communities and private landowners, with whom agreements are reached before work starts. All improvements or refurbishment of existing roads are carried out in coordination with the GOP or the owner, as applicable.

6.81 *Deviations of the existing ROW*: During construction, the pipeline route requires minor changes to avoid unstable areas, (e.g., water saturated soils, highly fractured areas, etc.), to improve constructability (e.g., reduce earth movement, increase safety), and to prevent and minimize environmental impacts (e.g., on archaeological sites, wetlands, sensitive fauna areas). These changes are usually identified during clearing activities and at a lesser extent during grading activities. According to the legal requirements established in the environmental permit for the Downstream Component, when the deviation is within the 3 km corridor evaluated in the EIA there is no need to re-submit to the governmental approval. But in case of deviations that go beyond the 3-km corridor of the ROW, an addendum to the EIA has to be submitted to the DGAA. According to the procedures approved in the ESMP, the contractor must notify TGP's environmental, community relations and archeological supervisors as soon as the need to any deviation of the approved ROW is identified and provide technical justification. In any case, environmentally and socially sensitive areas are to be avoided. In all cases, once a deviation is required, community relation officers should contact the owners of the affected parcels, and the abandoned ROW should be closed and restored.

6.82 Due to the environmental and social sensitivity of the area and the difficulties encountered in the terrain, a number of deviations have been submitted and approved by the DGAA (approximately 40). The main reason has been safety issues, given since the majority of the ROW is being used as access during construction, the ROW needs to placed on firm enough soils to safely support the heavy machinery and equipment used during construction.

6.83 *Trenching and Blasting:* Standard industry practices and procedures have been adopted for trenching, placement of trench spoil, rock blasting and storage and disposal of wastes in order to mitigate the environmental impacts associated with trenching operations. In locations where the topsoil layer is removed, it is stockpiled separately and the subsoil material placed in a separate windrow to avoid mixing with the topsoil. Near water bodies, the trench spoil is placed away from the banks to avoid potential runoff and sedimentation. When necessary, sediment control/containment devices have been installed between the subsoil stockpile and the water body. In areas of shallow bedrock, where the use of explosives is necessary to excavate the trench, the following mitigation procedures have been adopted: All explosives are stored in a secure, guarded area; the blasting supervisor is properly licensed and experienced; the set charges are covered with soil and/or blast mats to suppress fly-rock and noise; large charges are divided into small sequential shots; and the depth of the shot holes is such as to guarantee that the blast wave is contained. Specific communication and contingency measures are also associated with the procedures for blasting, such as a 24-hour advance warning of all blasting, evacuation of the blasting area of influence, and disabling of non-detonated explosive charges.

6.84 *River Crossings, Bridges, and Other Infrastructure Works*: Specific river crossing procedures were developed by the contractor and approved by TGP. These procedures establish that the construction programs must be designed to take advantage of the construction window derived from the hydro-climatological aspects of the region (period of minimum flow) and to reduce the time these areas are affected. The temporary and permanent erosion and sediment control measures to be implemented include: installation of silt fence and straw bale barriers; installation of slope breakers and runoff diversion channels (temporary and permanent); installation of drainage control structures (e.g., siphons, sump pump and channel/river diversion); excavation of retention/detention basins; preservation of vegetative buffer strips (minimum 5 meters width) at crossing areas; slope stabilization; and revegetation. These procedures also include the following provisions: wherever possible, river crossings must be perpendicular to the direction of flow, and in no way water flows can be obstructed; sedimentation pits must be built to reduce the turbidity of the water; to prevent flooding of the working area (ditching) water must be pumped to the sedimentation pits; and when the construction work has been completed, the watercourses must be restored to their natural condition, as to avoid flooding. Crossings involving directional drilling must include strict control of mud, fluids and waste materials to prevent contamination of the riverbank and deterioration of the water quality.

6.85 Typical restoration measures for river crossings include: installing trench breakers on slopes above the crossing to retard subsurface flow (piping) along the pipeline; restoring channel gradient and width (avoid narrowing or obstructing the main channel); grading and compacting stream banks to original or stable conditions; installing permanent slope breakers on the restored right-of-way above the crossing area; restoring original surface contours and elevations in wetlands and adjacent riparian areas; installing rock riprap and other engineered structures (e.g., gabions, cribbing or bio-engineered structures) on unstable stream banks and

slopes; and maintenance of temporary and permanent soil and sediment erosion control measures. When rivers are diverted for ditch digging, the trapped river fauna must be removed using nets and placed in the diverted flow.

6.86 There is only one bridge built associated with the Downstream Component, a temporary bridge over the Mantálo River. This bridge has a logistic use only it is being used to transport personnel and equipment from one side of the river to the other.

6.87 There is one aerial crossing designed to be built over the Comerciato River. This crossing will be specially designed to allow only the pipeline to cross over and prevent the opening of a new access.

6.88 *Opening through ecologically sensitive areas:* Specific procedures were designed for all the identified ecologically sensitive zones (see Table 6-1). These procedures include the following requirements: previous to the clearing phase, a group of environmental monitors must identify the presence of endangered species on the ROW; subcontractors must include the specific procedures for working on sensitive areas in the daily induction lectures; a system of warning signals must be set up to warn drivers of areas where woodland fauna may be encountered; daily induction and awareness lectures, especially to personnel working in the Otishi National Park and communal reserves Machiguenga and Asháninka[22] (previously know as Apurímac Restricted Zone) must include topics on the importance of the Peruvian system of protected areas. For the high Andean area, immediate mitigation, correction and compensation for any accidental impact to springs used for livestock is required. In areas near the breeding grounds of vicuña, special protection for the animals (e.g., fence and guards) is provided by TGP to the local population to mitigate the risks of animal's escaping. In the coastal area, the crossings over the Matagente, Chico and Cañete Rivers were scheduled outside the spawning and reproduction season of the river shrimp (January to April).

6.89 *Management of Archaeological and Cultural Remains:* The National Institute of Culture (*Instituto Nacional de Cultura* - INC) approved an archaeological mitigation and rescue plan for the Downstream Component. The plan includes the methodology, the proposed measures for protection of the site, and conservation, analysis, and final placement of the rescued materials. The corresponding operational procedures include restricting the width of clearing and grading, preventing surface disturbance by laying down construction matting or an earthen/gravel pad, and imposing special monitoring requirements. Archaeologists of TGP and the INC have carried out the implementation of the plan.

6.90 During construction, where it was identified that the pipeline route would cross important archaeological sites, deviations were recommended and have been implemented. Of the approximately 40 deviations that have bee developed during project construction, approximately 10 were related to the protection of archaeological sites. Training of construction personnel to recognize archaeological remains and prevent accidental destruction is also part of the induction and awareness lectures to workers. In addition, specific procedures were developed for the accidental discovery of archaeological remains (see

[22] The National Park and communal reserves were created on January 15, 2003 as a result of the IDB recommendations to GOP and part of the preparation of the IDB Institutional Strengthening Public Sector Loan.

Managing Contingencies). These procedures include immediate stop of work in the immediate vicinity and secure isolation of the site until an investigation is completed.

6.91 *Fluvial and Road Transportation Plan:* TGP and Pluspetrol have implemented an integrated River Transportation Plan (see Section 6.2.1 for details). In addition, TGP has implemented a Road Transportation Plan, which includes transport of fuel and supplies procedures. The transport of fuel and supplies is done by fuel trucks provided with equipment for containing and responding to spillages and that carry the United Nations (UN) identification number of the products carried on its three visible sides, safety notices or the warning diamond of the Peruvian Fire Protection Association (danger, fuel or danger, flammable), as well as safety equipment. In addition, all drivers receive training in spillage prevention and response and the vehicles used to carry fuel are inspected to ensure that they are operating correctly. Additional information on the Transportation Plan is provided under "Managing Health and Safety Issues" section, given that the IDB identified that, during construction, transportation was a significant source of safety risks.

6.92 Environmental Training Plan: The Plan contains training modules specific to each activity implemented during either construction or operation of the Downstream Component. Workers are trained on the specific procedures designed for the project. Examples of construction training include: the implementation of the specific prevention, mitigation, and or corrective measures; procedures for the classification, separation, and disposal of domestic and industrial wastes; mechanisms to control clearing of secondary access routes; revegetation; avoidance of water and ground contamination; management, storage, and disposal of hazardous wastes; mechanisms to control erosion and sedimentation; protection of biological resources; protection, reporting, and handling of artifacts and archaeological resources; emergency preparedness; restoration of degraded or altered areas; and protection of Andean wetlands (*bofedales*).

6.93 Waste Management Plan: The Waste Management Plan describes waste management practices for the construction and operation phases of the Project. The plan must be implemented by TGP's contractors and subcontractors. The waste management strategies include the reduction of volume, recycling, compacting, composting, storage, incineration, and use of sanitary landfills.

6.94 Closure and Reclamation Plan (including Revegetation Plan)*:* Closure of the pipeline construction activities consists of the removal of all infrastructure, installations, and the revegetation and rehabilitation of the land. Following lower-in and backfill operations, the closure (reclamation) phase is initiated promptly and stays closely behind these operations. In general, reclamation involves the collection and removal of construction waste (cleanup), grading to restore original or engineered land contours (restoration), and seeding and planting of native vegetation to stabilize the restored right-of-way and other work areas (revegetation).

6.95 Revegetation of the ROW and associated areas of the rainforest section of the Downstream Component is necessary to ensure the stability of the soil, and thus the pipeline safety. It is a legal requirement under Peruvian legislation and an important measure to prevent the use of the ROW as a mode of access. A draft Revegetation Plan has been developed by TGP and is being finalized in consultation with IDB and other stakeholders. The Revegetation Plan builds on two principal field experiences: (i) the revegetation plan implemented by Shell to revegetate the gas wells and the helipads used for pipeline route selection; and (ii) experiences

learned by TGP in the field during the rainy season of 2002 - 2003, when a natural revegetation process was initiated in areas that were either temporarily or permanently closed. TGP reviewed Shell's revegetation plan, including the different strategies and species used at different locations, such as the gas wells and the heliports. This information was evaluated based on the field results in June 2003, in CS-2, CS-3 and Pagoreni (which is outside of Block 88), and five years after the areas had been revegetated and given no subsequent maintenance or monitoring. It was identified that over 90% of the area had been effectively covered with trees and bushes, including some species that had not been seeded. Given that soil and light conditions in the gas wells are similar to those in the ROW, TGP included the same parameters and strategies in the Revegetation Plan. The experience in the ROW during the rainy season of 2002-2003 also provided important information regarding the natural regeneration of the forest cover. This includes the identification of appropriate native species and natural successions.

6.96 The principal objectives of the Revegetation Plan are to: (i) regenerate the soils; (ii) regenerate the vegetation cover; (iii) reduce erosion and sedimentation in water bodies; and (iv) discourage the use of the ROW as an access road. The plan will be implemented over approximately 2,133 ha, including 966 ha of ROW, and 1,026 ha of slopes, 87 ha of campsites, 42 ha of shoo-flies, 4 ha in Las Malvinas site, and 8 ha in pumping stations. The design of the ROW aims at rehabilitating the original land uses while ensuring the pipelines' safe operation. International safety standards require that a permanent access be available for inspections, leak detections, emergencies, and preventive maintenance. In the case of the Camisea pipeline, most of the inspections will be either aerial or performed on foot. This will allow for the complete revegetation of the ROW, with trees, bushes and pastures, with the exception of a 5-8-meter wide permanent ROW (over the two pipelines) where there will be only low growth vegetation and thus allowing for inspections and preventive maintenance. For use in event of emergencies, there will be (in one side of the ROW only) a 4-meter area adjacent to the permanent ROW, that will be covered with bushes and small vegetation.

6.97 In October 2002, TGP signed an agreement with the Natural History Museum of the National University of San Marcos (*Museo de Historia Natural de la Universidad Nacional Mayor de San Marcos*) to develop biological inventories of flora and fauna, in five sectors of the ROW that are representative of the ROW in the rainforest section. Approximately 75 plant families were identified and 1600 samples were collected. Currently, TGP proceeds with an inventory of the natural regeneration that occurred in the spoil storage areas along the ROW. TGP is currently conducting field investigation to determine which species will be more tolerant to the dry season. The species that will be then identified will be further selected according to their requirements for luminosity, and also speed of growth and adaptation to already disturbed areas. As of June 2003, the species that predominate naturally in the ROW are *Trema micrantha, Ochroma pyramidale* and *Cecropia spp*. TGP is also conducting field investigations in the 11 active nurseries, to identify resilience of the plants to the new conditions that will be encountered in the ROW (particularly light).

6.98 The proposed Revegetation Plan will use primarily native species. Consideration is given to the use of *Vetiveria zizanioides* "vetiver", particularly in areas of steep slopes over the 2,000 meters, to enable complete soil stabilization and further revegetation with trees and bushes. The use of vetiver is considered given the inert condition of the seeds produced by the plants, making it non-invasive, and proven experience for erosion control. The majority of the species are being collected from the forest and produced in 13 existing nurseries installed along the

ROW, close to local communities, for the rainforest section. Each nursery has approximately 10,000 m^2 and covers approximately 12 km of the ROW. Some non-native species produced in Peru will be acquired locally, such as *Centrocema macrocarpum, Arachis pintoy* (*maní forrajero*) and *Crotalaria juncea* in areas of current agricultural land use. Once construction is finalized, seven nurseries will remain active for five years during the maintenance and monitoring of the Revegetation Plan. These nurseries will be managed by local communities that are currently being trained by TGP in the existing nurseries.

6.99 Final closure (at the life end of the Project) will consists of the dismantling and removal of permanent installations used during the operative phase of the Project. These installations include pumping stations, pressure reduction stations, control valves, cleaning and final closure of pipelines. The Closure Plan will be updated to closure standards at the time of implementation, which is not estimated to occur until 30 years or more from now, depending on the detection of additional commercial gas wells in the area.

Managing Social Issues

Direct Impacts

6.100 The mitigation and monitoring measures for the social direct impacts of the Downstream component are consolidated in the Community Relations Plan, which is to be followed by both TGP and its contractors. These mitigation measures are organized in the following principal programs: (i) negotiation of land use agreements; (ii) temporary contracting of local personnel; (iii) program of acquisition of local products; (iv) training program for project personnel; (v) management plan in the event of contact with new indigenous groups; (vi) communications and consulting program; and (vii) emergency medical plan for communities in the project's area of influence. In addition the plan contains: (i) a Local Development Program (LDP); (ii) participation of the local population in socio-environmental monitoring and management; and (iii) the Workers' Code of Conduct and camp confinement policy.

6.101 Negotiation of Land Use Agreements: This Program sets the framework under which TGP has acquired and leased the lands used for permanent infrastructures, temporary facilities and the ROW. There are five types of compensation: (i) acquisition by marked-based value of land required for permanent infrastructures such as the pumping stations, pressure reduction stations and surface facilities; (ii) temporary affectation of crops during the construction period; (iii) temporary use of areas for facilities associated with the construction including quarries, temporary storage areas for soil, pipeline sections storage areas, camps and temporary access roads; (iv) use of the ROW during the construction period and (v) compensation for the long-term restrictions of use of the ROW during the pipeline operation phase. Communities have the right to sell the land with an easement attached for the pipeline. The company has the right to extend the easement automatically for 60 years without additional payment in crop compensation, but the company will have to pay for the use of the land for this extended period.

6.102 For the construction phase, a 25-meter ROW is required and only temporarily leased by TGP for the duration of the construction of the pipelines[23]. Subsequently, during the operation phase

[23] Compensation is for a minimum of 25 meters even when less area is required.

the ROW will be reduced to approximately 15 meters, on average, where restrictions on land use will apply. These restrictions include mainly limitations for certain long-root agricultural crops, excavations and construction in the ROW. Given the nature of the construction works and uncertainties regarding the precise extension and type of affectations, all temporary lease contracts provide for additional compensation for any and all non-foreseen impacts. Such additional compensation will be made upon termination of the construction activities in the affected area.

6.103 Compensation for the land and effects on crops were calculated using a clear and transparent methodology. Negotiations with communal landowners took place in the communities, in their own language. In all cases, the negotiation process provided adequate time of two weeks average for discussions between the community members and consultation with their advisors. To reach an agreement, a minimum of two-thirds of the indigenous community assembly must be in conformity. The agreement is made in the presence of a public notary.

6.104 The methodology uses, as initial reference an official minimum value set by CONATA *(Consejo Nacional de Tasaciones*), projected for 33 years of the concession. This initial value is added up with the results of a detailed visual inspection of the land and a detailed inventory of its natural resources and associated economic value (including the cultural use of the resource), which is carried out with three community representatives. The costs of production and income losses during the construction period of time and other impacts (water quality, noise) are then added to reach the final price of the land.

6.105 Under the Program, payments can be made either in cash or in the form of social infrastructure or development projects to be provided to the community. Payments made in cash must be made in a communal meeting and are made in three installments. The first at the moment of signing (30%), the second at the start of actual construction (40%) and the last (30%) upon completion of all pipeline construction (estimated for 2004), so that adjustments can be made for unexpected damages. This last payment is made based on a joint detailed inspection of the land by TGP and community representatives in order to assess and value the impacts and damages beyond the 25-meter strip of ROW previously compensated.

6.106 In all cases the entire negotiation process is fully documented. Participation of CEDIA, COMARU, and other community associations (at the request and choice of each community) and of the national ombudsman (*Defensoria del Pueblo)* are likely to have ensured adequate and fair negotiation process. TGP has signed contracts with nine native communities and around 50 Andean communities for the compensation of easements and damages to crops. In addition TGP also signed contracts with, settlers and individual property owners. As of May 2003, of a total of approximately 2,350 anticipated contracts, 2,109 have been signed (292 in the rainforest (100%), 1,378 in the highlands (98,5%) and 439 in the coast (58%)).

6.107 Training Program for Project Personnel*:* The objectives of this program are to ensure that all the workers understand: (i) the social environment in which the project is taking place; (ii) TGP's requirements and commitments in relation to the project; and (iii) the consequences and

punishments applied to infringements of TGP's regulations. This program applies to all TGP's workers or contractors involved in any activity associated with the project.

6.108 Local Hiring Program: Given the large demand for employment and the need to discourage migration, the program's objectives are: to maximize the number of local personnel hired in the direct area of influence of the project; to minimize local expectations regarding potential jobs; and prevent people from outside the area arriving at the camps and sites seeking for work. Preference is given to the members of communities directly affected by the project and the communities are responsible for indicating those to be hired. To maximize the number of employment offers and accommodate the large demand to the available job positions, TGP hires local workers on a three-months limit basis. As part of the program, all workers pass a medical examination and are immunized against the most prevalent diseases in the area (e.g., malaria, yellow fever, rabies and influenza).

6.109 Acquisition of Local Products Program: The program aims at maximizing opportunities to purchase products at a regional level while minimizing local expectations concerning potential local purchases, in particular in the rainforest, as to avoid non-sustainable dependency of the local farmers on the Company's purchases. The program prohibits TGP and its contractors from getting involved in trade or commercial activities with native communities and instead, promotes commercial activities with the communities in the highlands areas of the project. Nevertheless, since the project's implementation, the native communities in the rainforest have consistently complained about this policy. TGP has since then revised its program and engaged in local purchases, on a case by case basis, when TGP has identified that no negative impacts either on the short-term (e.g., decline of products available to the communities and consequential health and nutrition impacts) or the medium-term (e.g., unsustainable dependency on the Company's purchase after construction is terminated) were likely to occur.

6.110 Contingency Plan for Accidental Encounters with Indigenous Peoples: Compliance with the procedures is mandatory for all TGP and subcontractor's personnel, even though there are no reports of people living in voluntary isolation in the Downstream area. The program includes: (i) vaccination of all workers against influenza, yellow fever, trivirica (measles, mumps and rubeola), tetanus and diphtheria, rabies, hepatitis A and B; and (ii) a physician trained to treat epidemics among indigenous peoples is permanently stationed at the base camp or fly camp.

6.111 Local Development Plan (LDP): In addition to compensation paid for the ROW of the pipelines, TGP provides support to certain local initiatives with the different groups in the direct area of influence of the project. Support for local initiatives is included within a framework of active participation and contributions from the community, where these initiatives are identified and given priority in a dynamic consultation process within the local communities. For the LDP to be sustainable and self-managed by the communities themselves, TGP ensures that (i) the Plan benefits the community or social group as a whole and (ii) it contributes to local and/or regional sustainable development. These objectives are only referential because the active participation of the beneficiaries (e.g. community members and the organization involved) in each of the proposed projects is a fundamental condition. From the first and second consultation rounds to identify the community's proposed projects, the beneficiaries showed a very passive "receiving help" attitude. Therefore, the LDP meetings that are currently being held with the communities are addressing issues such as community strengthening and active participation of its members, to ensure their active participation in these projects.

6.112 The implementation of the LDPs will be distributed along the 33 years of the concession. Each year, needs assessment and project design activities will be developed, under the rural participatory appraisal methodology. During the year 2003, 50 to 80 projects are planned with a budget of approximately US$1 million. Some of the initiatives already identified in several communities meetings are: health care and education programs and infrastructure according to governmental planning; fences, community social areas, improvement of a church, scholarships, radios, etc. The members of the communities involved are in charge of the supervision and control of the projects and/or participate by small contributions with local resources.

6.113 Additionally, the IDB Institutional Strengthening program incorporates the creation of an Environmental, Social and Economic Regional Development Fund designed to help the long-term distribution of economic benefits raised by the Camisea Project to communities in the area of indirect influence of the Camisea Project (see Section 6.6 for details). The LDPs are funded by TGP alone in communities directly affected by the Downstream component, whereas the Environmental, Social and Economic Regional Development Fund will include resources for both the GOP and the Project Companies, and will support community's projects on a regional basis.

6.114 Emergency Medical Plan: The objective of the plan is to minimize any immediate risk to the population, as well as risks to the project workers. The Plan includes the availability of a well-trained team of health professionals to administer vaccinations and treat local people, in case of any accidents and epidemics related to the project.

6.115 Communication and Consultation Program: The Program was developed with local and regional participation, particularly from those directly affected by the Project or living along the right-of-way and focused on public participation in the development of the EIA and establishing and maintaining community relations.

Indirect Impacts

6.116 Measures to Control Colonization of the Region: Effective control of colonization and induced urbanization in the short, medium and long-term depend on the implementation of adequate strategies by TGP, Pluspetrol, and the GOP. One principal measure adopted by TGP and Pluspetrol to avoid potential induced colonization is the various design aspects of the Camisea Project, which minimize the use of access roads (see Section 6.1 for details).

6.117 In addition, TGP has developed a Migration Control Strategy (MCS) to mitigate the potential negative indirect impacts due to uncontrolled migration via the pipeline ROW into the Lower Urubamba and the resulting potential of social impacts, such as cultural clashes between settlers and native populations and disputes for land possession. This MCS was based on a baseline study of the migration patterns used by the settlers and in the current migration trends into the Urubamba basin. Based on the baseline study, the MCS was conceived since the early stages of the project development and incorporates measures that were adopted at the design phase and measures to be implemented throughout the construction, closure of the ROW and operation and maintenance phases of the project. The principal components of the MCS are summarized below:

6.118 In terms of design, specific criteria for route selection have been used to control colonization. For example, the use of the difficult terrain and mountain ridges for the ROW significantly reduces the number of potential "entrance points". The slopes of the ROW in the rainforest are predominantly in the range of 30 degrees with some reaching 45 degrees, which makes the ROW almost impossible to drive, given that road design requires a maximum slope of 10 degrees. Government efforts to issue land titling to the existing population and to native communities living along the pipelines' route[24] have reduced access and potentially available land for settlement.

6.119 During construction, the following measures are being implemented, which so far have resulted in no known migration: (i) the "off-shore in land" approach to construction and operation, which minimizes the need for access roads and maximizes river and air transportation; (ii) use of the ROW to transport personnel, materials and machinery, as much as possible; (iii) leaving a 15 km discontinuity in the ROW between Upper and Lower Urubamba, in the Vilcabamba range, during the rainy season between 2002 and 2003, when construction works were temporarily stopped; (iv) the local employment policy, which emphasizes the use of workers from local communities, including natives, and incorporates a management plan for the non-local workforce, which includes transport of the non-locals in and out of the project area at their off-time and end of employment contract; (v) implementation of a communication campaign in both Spanish and Quechua, by radio, newspapers and other media, to disclose the local-employment-only policy and inform of the unavailability of jobs at the campsite, aiming at discouraging potential migrants in look for work opportunities and reducing the expectations of the population.

6.120 Upon completion of construction, in addition to the revegetation of the ROW with trees and bush-types vegetation, the following measures are planned: (i) complete revegetation of shoo-flies, storage areas and any other areas previously used during construction; (ii) the temporary bridge over the Mantálo River will be dismantled and removed from the site; (iii) installation of waterbars across the whole ROW in the rainforest section; and (iv) installation of four "vegetation plugs"[25] (two in the Upper Urubamba and two in the Lower Urubamba) to reduce the ROW to a small trail over the pipeline. Although the final species that will be used depend on the final location of the "vegetation plugs", initial studies indicate that *bamboo* is the preferable option due to its rapid growth, shallow root system, and high-density growth pattern. In addition, the MCS will continue to be implemented during operations, with specific measures for the operational phase (See Section 6.3 - Environmental, Social, Health and Safety Management during Operations).

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[24] TGP has hired the NGO *Centro de Desarrollo del Indígena Amazónico* (CEDIA) to develop the initial cadastre of titled lands, communities, rural settlements, and other land users in the areas surrounding the pipeline in the rainforest section. As a result, TGP signed an agreement with the Government's program for land titling (*PETT-Programa Especial de Titulación de Tierras*), contributing with approximately U$250 thousand to the implementation of the program in the areas identified by CEDIA. Additionally, as a result of IDB recommendation and GOP's initiative, the Reserved Zone of the Apurímac was finally categorized, with the creation of the Otishi National Park and the two Communal Reserves *Ashaninka* and *Machiguenga*. The creation of the Megantoni Santuary in the *Pongo de Mainique* area and the enhanced protection of the Nahua-Kugapakori Reserved Area are also envisaged as part of GOP's activities under the IDB Public Sector Loan.

[25] A "vegetation plug" consists of a high-density tree plantation

6.121 Additionally, TGP will perform a long-term monitoring of land use and regional deforestation on a three-year basis (with the use of satellite images), which will also enable the identification of any undesired settlement patterns. TGP will inform the appropriate Peruvian authorities of any illegal settlement identified either on the field or by the remote sensing and will provide all the logistics required by GOP to address the situation.

6.122 Measures to Promote Land Titling and Regularization: The primary responsibility for land titling and regularization of indigenous reserves and community lands, and natural protected areas in the area of influence of the Camisea Project lies with the GOP. In this respect, the IDB has worked with the GOP to execute a Public Sector Loan to enhance the monitoring and enforcement capacity of the GOP entities, in particular to develop the appropriate initiatives with regard to the land titling and regularization activities necessary to mitigate and prevent secondary negative impacts such as the uncontrolled colonization and urbanization. Information regarding all components of the IDB Public Sector Loan is provided in Section 6.6 - Institutional Strengthening of GOP.

Managing Health and Safety Issues

6.123 The Health and Safety Plan incorporates health and safety policies and procedures. The plan defines over 25 specific health and safety procedures for the different construction activities performed, including: (i) installation of scaffolding and platforms; (ii) work in confined spaces; (iii) use and storage of hoses, electric cables, extension cables, and ladders; (iv) emergency situations; (v) protection against falls; (vi) operation and inspection of perforators and cranes; (vi) operation of equipment and machinery; and (vii) operation of mobile equipment such as cranes, loading machines, elevators, motorized vehicles, tractors, and platform trailers.

6.124 During the IDB due-diligence it was identified that transportation-related accidents were a major source of safety risk, in particular the road transportation in the narrow and sinuous non-paved road between Calca and Kiteni. Upon request from IDB, TGP implemented additional special safety measures for the Calca – Kiteni access road and improved dust control (effective July 2002) along the areas where the road crosses existing communities. Pisco-Vinchos, Nazca-Chalhuanca-Calca and San Miguel - San Antonio roads where also addressed. The following initiatives were undertaken to help reduce risks: (i) six road safety inspectors were incorporated; (ii) standardized safety signals on the roads according to the GOPs Ministry of Communication and Transportation standards were posted, signal posts were painted with reflective paint in unstable areas of the access road and the bridge limits, and signals warning the oncoming vehicles about the aerial wires and water lines were installed; (iii) the Emergency Response Plan (ERP) was reviewed and coordinated with the assistance of the Calca Firefighters and the National Police, and bi-monthly emergency drills and training to drivers were included. Defensive driving and risk workshops for the transportation groups, National Police, Ministry of Communication and Transportation and community representatives were organized, with previous coordination with the Community Relations Department. Seven workshops were held during the month of November 2002 in communities located along the Calca-Kiteni Road. Response to this program has been positive and consequently, a similar program was implemented for the San Miguel – San Antonio road as well. The existing alcohol control along the route was reinforced, creating an alcohol control test center in Calca and incorporating monitoring of the Cesaro and Repsol personnel, and any other personnel driving with equipment that belongs to the project. Checkpoints have been established along the route to control convoy speed and location and vehicles were

equipped with the basic means and equipment established in the procedures. Techint verifies in the checkpoint in Calca the existence of the scales in each vehicle, provide the necessary personal safety equipment (e.g., helmets, safety boots, safety goggles, reflective vest and gloves). Route supervisors check the correct use of this equipment and hand out to the road users the safety road analysis, including maps, emergency phone numbers and arrival and departure schedule. All trucks travel in convoys escorted by two pickup trucks and have permanent contact among them. One pickup truck is ahead of the large trucks in order to divert traffic and inform the population of the imminent pass of the convoy, and the other pickup truck travels behind the convoy to inform the population of the ending of the convoy.

6.125 Improvements were also made in the air transportation program. TGP hired an external auditor registered with the General Directorate of Air Transportation of the Ministry of Transportation who evaluated air safety practices and procedures and compliance with all applicable regulations. The Quiteni airfield has been improved by doing maintenance of the runway surface, cutting down trees that could pose an aviation hazard, increasing the rescue equipment available, and improving the conditions of air operations control room. Regular operations coordination meetings are now being held by the operators of the Quiteni, Malvinas and Nuevo Mundo Air Control Centers.

Managing Contingencies

6.126 Contingency Plan: TGP developed and implements a Contingency Plan to put in place effective and timely procedures and basic response actions for dealing with accidents or emergencies that occur during construction of the project. The plan describes the organization, procedures, types and quantity of equipment, materials, and manpower required for a variety of project specific emergency response situations. The Plan establishes specific emergency response, evacuation and control measures to use on-site, and basic first aid instructions to assist sick or injured workers after the accident and prior to receiving medical attention. The principal accidents and emergencies considered a potential risk during construction phase include: terrestrial and fluvial accidents, safety emergencies, land slides, soil contamination as a result of oil or gasoline spills/ leaks, and fires.

6.127 Emergency Response Plan: This plan includes specific procedures to address helicopter accidents, road accidents, river accidents, fires, landslides, and hydrocarbons spillages on land can occur during the transport of fuels, maintenance or refueling of machinery, and spillages of hydrocarbons in rivers or watercourses may occur during transport or spillages on land may reach watercourses. Specialized training is carried out for selected individuals that form response "brigades". These brigades are responsible for responding to these potential emergency incidents across the pipeline ROW. The procedure contains the specific action to be taken depending on the size of the spillage, the substance involved and the area affected.

6.128 Following a spill that occurred in Las Malvinas campsite during the IDB environmental and social due-diligence in May 2002, caused by a bladder seam failure, TGP reviewed its Contingency Plan and Emergency Response Plan. All campsite fuel storage areas were inspected and checked for proper secondary containment. A new checklist that includes verification of secondary containment capacity, distance to water bodies, possible spill directions, spill containment materials, and proper training of the operator was developed for inspections of all new fuel storage prior to their operation. Containment capacity was set to 125% of the maximum storage capacity vessel in order to account for high rain events during

construction activities. The location of temporary and permanent fuel storage sites has been restricted to more than 30 m. away from any watercourse. Spill response training for the operators is being registered and checked. Procedures for discharging rainwater accumulated in the containment area were reviewed and improved.

6.2.3 Distribution Component

6.129 The mitigation measures and monitoring programs for the construction phase of the Distribution Component are consolidated in the Environmental and Social Management Plan – ESMP (*Plan de Manejo Ambiental*) prepared as part of the EIA for the project. The PMA comprises 5 specific programs: (i) Prevention and Mitigation Plan; (ii) specific management plans, such as the solid wastes management plan, air emissions control plan, and revegetation plan; (iii) Social Mitigation Plan; (iv) Community Relations Plan; and (v) Management of Cultural Heritage Plan. The ESMP was further detailed as part of the contractual agreement with the construction contractor as to provide specific and detailed procedures for construction.

6.130 The Prevention and Mitigation Plan includes a number of procedures to address the following construction activities: excavation, trenching, assembling of pipes, filling, transportation of materials, soil compactation, operation of borrowing pits and disposal sites, and revegetation, among others, and where appropriate procedures are designed for specific areas of environmental sensitiveness. These procedures aim at controlling the principal potential environmental impacts from construction, such as: noise and air emissions (dust); water contamination in stream crossings; erosion, sedimentation and soil compactation (only in agricultural areas); impacts on flora and fauna (in the rural areas near Lurin); and impacts associated with domestics and hazardous wastes (oils and lubricants).

6.131 The Community Relations Plan includes the Compensation and Indemnification Program, the Communication and Consultation Program, the Training Program, and the Participatory Monitoring Program.

6.132 Tractebel has developed a Health and Safety Plan (HSP) that is imposed on the EPC Contractor by contractual clauses. The HSP includes a number of operational procedure to ensure safety at work. These procedures address the principal activities where health and safety risks have been identified, such as transportation, machinery operation, excavation and trenching, fires, explosions, and working in confined spaces among the principal. The HSP also includes a training component and specific emergency procedures in case of accidents.

6.3 Environmental, Social and Health and Safety Management for Operations

6.133 This section presents a summary of the environmental and social, and health and safety management plans for the operational phase for each of the three components of the Camisea Project. All components of the Camisea Project have developed, as part of the approved EIAs, Environmental and Social Management Plans (ESMP) for operation activities, which include environmental and social mitigation measures, contingency plans and procedures, and monitoring programs. Specific and detailed Environmental and Social Management Plans (ESMP), Health and Safety Plans (HSP) and Contingency Plans are planned to be developed prior to the operation of each component.

6.134 The ESMPs are to include: (i) a detailed description of all necessary environmental and social mitigation measures and monitoring programs, including all those identified in the EIAs and government approvals; (ii) an estimated cost, time schedule and assigned responsibility for implementation for each mitigation measure and monitoring program; (iii) a description of the specific project supervision methods to be implemented to ensure that all measures and programs are completely and properly implemented; (iv) a description of the planned environmental, health and safety management system, including description of personnel and their duties and required training; and (v) a description of ongoing public consultation and information disclosure activities.

6.135 The Health and Safety Plans (HSP) are to include (i) a description of potential health and safety hazards based upon the specific project works/activities; (ii) a detailed description of all necessary procedures and equipment which are technically appropriate to deal with all specific health and safety issues of each activity; (iii) a clear and complete description of all responsibilities and authorities related to the implementation of the plan; (iii) a description of the specific project supervision methods (e.g., audits, documentation and record-keeping, on-site monitoring, medical surveillance, etc.) to be implemented to ensure that the plan is completely and properly implemented; (iv) a description of the specific health and safety training that will be provided to all workers involved with the project and the minimum levels of training required; (v) a description of emergency response procedures; and (vi) an estimated cost and time schedule and assigned responsibility for implementation for each component of the plan.

6.136 The Contingency (Emergency) Plan should describe in detail, the potential risks or emergencies, and the necessary measures, procedures, equipment, training, responsibilities, schedules, and resources (including monetary and manpower) required to adequately control, respond and remediate all potential risks and emergencies. The Contingency Plan should also include a Spill Prevention and Countercontrol Plan (SPCC). The SPCC will describe in detail, the potential types of releases and the likely pathways (movements); the necessary measures, procedures, and equipment to adequately respond, control, and remediate any spills or accidental releases; the staff and organization responsibilities; training; and reporting.

6.3.1 Upstream Component

Managing Environmental Issues

Gas Wells and Associated Facilities

6.137 The operator of the gas wells and the associated facilities will develop specific Environmental and Social Management Plans (ESMPs), which will detail all the operational procedures to be implemented during the operation and maintenance of the gas production fields, gas plant and the fractionation plant and associated facilities. The ESMP will detail the general mitigation and monitoring proposals approved in the EIA, including: minimization of surface disturbance and implement restoration/revegetation activities; maintenance of adequate systems for collection, treatment, and disposal of solid and recyclable waste and industrial wastes; effective control of staff access/activities to reduce impacts on flora and fauna near well sites, industrial facilities, flowlines and along access roads; and management of hazardous wastes at all project facilities. In addition, specific procedures of measures approved as part of the EIA are summarized below.

6.138 Waters used in hydrostatic tests of the flowlines: Water used to test the pipeline will be taken from water bodies approved for this purpose at adequate rates and will be treated prior to being discharged. If water is extracted from a course of water with aquatic biota, rivers or reservoirs, the intaking pipe must have a filter with a mesh to prevent the passage of biota. If water is discharged on the ground after the test, it must be spread over an area with enough vegetation cover, temporary rip-rap (arid layer, aggregates of sand bags placed on the topsoil) or any other surface made of stable material to prevent any erosive process. Pumps used for test operations will not be located less than 30 meters away from waterways. Equipment will be placed on a polyurethane layer to prevent hydraulic flows and/or fuel spills from spreading into the water body. If the installation of irrigation pumps in the waterways is necessary, these will be installed in a container capable of containing 110% of the gasoline-petrol-oil capacity of the pump. Pluspetrol will inspect testing and unloading areas permanently.

6.139 Management of Venting Pits and Incinerators used for Gas and Liquid Hydrocarbons in Well Testing: During test and completion operations, an adequate pit is required to incinerate gaseous hydrocarbons and effluents, under safety regulations. Furthermore, this pit should be oriented according to the predominant winds, and a weed-undergrowth clearing over 5 meters wide will be carried out to avoid vegetation from catching fire.

6.140 Control of Air Emissions at the Las Malvinas Plant: Air emissions generated at the Las Malvinas plant will be reduced with the use of best technology applicable to the design and operation of the plant. The technical specifications requested by Pluspetrol to equipment suppliers are based on standards from the World Bank and the U.S. Export-Import Bank. In addition, a specific maintenance program for land, river and air transportation vehicles will be implemented to minimize gaseous emissions.

6.141 During the startup phase, to minimize the need for venting, a gas-burning torch will be used. Native communities will be advised and warned about the days of occurrence and the approximate duration of testing activities as well as the startup of the Plant that could generate smoke emissions, venting and/or burning or gas. During the operation phase, the gas-burning torch will only be used in case of an emergency.

6.142 Control of Wastewater Effluents at the Las Malvinas Plant: All liquid effluents generated at the Las Malvinas plant will be adequately segregated for separate treatment. Non-contaminated surface runoff will be discharged in the Urubamba River, after passing through a sediment-containment basin. Sanitary effluents will be treated. Industrial effluents will undergo primary and secondary treatment. Laboratory effluents will be neutralized then treated with industrial effluents.

6.143 Noise Levels: Noise emissions from equipments (e.g. compressors, generators, motors pumps, turboexpanders, and others) will be reduced with the use of noise abatement measures, such as silencer, acoustic insulators, and others, as appropriate.

6.144 Excessive Illumination: In Las Malvinas plant, the lighting required in external areas of the plant will be minimized and a forest curtain will be set up around the plant in order to mitigate the impact caused due to the lighting systems.

Fractionation Plant and Marine Terminal

6.145 Two specific and detailed Environmental and Social Management Plans (ESMPs) are required: one for the fractionation plant and one for the marine terminal.

6.146 With regard to the fractionation plant, the ESMP will include, among others, procedures to adequately: vent and/or flare process gas; pumping, loading/unloading and transfer of fuels and lubricants; handling and storage of chemical, toxic and fuel products, treatment and disposal of liquid wastes; and domestic and industrial wastes, including hazardous wastes. The ESMP will also include maintenance procedures, including equipment maintenance to minimize leaks, losses and any potential contamination of soil, water and air. Summarized below are some principal ESMP components.

6.147 Vent and Flare: The plant ground torch will handle and flare all the gas vented by the safety surge valves and drain valves at both the plant and the sea terminal. The plant emergency venting will be reduced to a minimum, as the plant will shut down whenever abnormal operating conditions are detected. The plant torch system will be made of a high-pressure relief sewer/drain manifold, a low-pressure relief sewer/drain manifold, a relief/drain cleaner, and a ground torch for each system. The terminal's ground torch flare will handle propane and/or butane products during the tankers' loading process, but only in emergency situations. Tankers will include a steam recovery system on board.

6.148 Noise Emissions: With regard to noise, the noise emissions will be controlled at the source equipment (compressors, generators, motors, pumps, etc.) and productive processes with the installation of mufflers, noise isolation systems, and other appropriate measures. These will be based on a plant noise assessment. This assessment will include: a preliminary noise assessment (based on the tentative location of machinery and on the theoretical noise values obtained from the database), and a final noise assessment, based on the definitive location of the machinery and noise data provided by equipment suppliers and real measurements.

6.149 Liquid Effluents: Sanitary effluents will be collected and taken to a effluent treatment plant (activated mud process followed by chlorination). Open drainage liquids will be collected in sumps, where separated hydrocarbons will be pumped into the residual oil tank and the oily water will be pumped into the wastewater tank. The hydrocarbons accumulated in the tank will be pumped into a water-oil separation tank. Liquids accumulated in the residual oil tank will be pumped as part of the liquids to be fed into the primary distillation unit to the extent possible or, otherwise, such liquids will be regularly removed, transported and treated outside of the Plant by authorized operators, as will the liquids accumulated in the wastewater tank.

6.150 Fuels and Lubricants: Storage tanks will be aligned by product within the contention cells (designed to retain 110% of the capacity of the largest tank within the cell), which will be covered with an impermeable membrane to avoid filtrations into the subsoil or underground water (or with a compact clay layer to achieve a permeability level of less than $1x10^{-6}$ cm/sec). Each retention cell will include a sump-ditch to collect any liquids spilled, and each sump will include a pump to transfer the liquid hydrocarbons to a residual oil tank.

6.151 The refrigerated storage tanks for propane and butane, will include secondary contention earth ditches (retaining up to 110% the capacity of each tank until the corresponding vaporization process has taken place). These ditches will be made waterproof with compact clay or impermeable membrane as to achieve a permeability level of less than $1x10^{-6}$ cm/sec. Fuel tanks will also be stored in tanks with a 110% capacity secondary retention system. The fuel

tanks' loading and unloading connections will be clearly visible in order to easily detect possible filtrations. Pumping and transfer equipment will be explosion-proof.

6.152 Potable Water: Fresh water will result of the extraction and treatment of salt water from shallow water wells drilled in situ. If the water extracted from the well is salt water, a reverse osmosis filtering system or a similar filtering system will be used to treat the water to a potable standard. The potable water source will be an external supplier of bottled water.

Managing Social Issues

Gas Wells and Associated Facilities

6.153 The Community Relations Plan (CRP) for Block 88 is an integrated document, designed to address the potential social impacts from the different components of the Camisea Project. The CRP is part of the Environmental Management Plans (EMP) proposed in the EIA and has been enhanced throughout the construction period. The Community Relations Plan specific for the operation phase will be developed based on the feedback of the CRP implemented during the construction phase.

Fractionation Plant and Marine Terminal

6.154 A Community Relations Plan specific for the operation phase of the fractionation plant and marine terminal will be designed and implemented. This plan may include the sponsorship of schools, welfare institutions, museums, etc, the sponsorship of art, cultural, sports and other events, the implementation of community integration and communication programs, among others. It will also include a personnel-hiring policy to prioritize contract of local manpower, consumption of local products, and local suppliers. The neighboring communities will be given notice and warned of the performance of work involving the testing of equipment and startup of the plant, which could result in an increase in noise or emissions.

6.155 In addition, as part of the environmental permit issued by the GOP for the fractionation plant, Pluspetrol is required to implement a number of "corporate social and environmental commitments" agreed with INRENA, such as:

(i) Support the development of studies for the adequate integrated waste and wastewater management in Pisco, San Andres and Paracas municipalities;
(ii) Support the rehabilitation of the environmental rehabilitation of the Paracas National Reserve, including the implementation of the Master Plan;
(iii) Support the rehabilitation of the environmental and social conditions in the Paracas Bay and improve the artisan fishermen activities;
(iv) Implement environmental education programs;
(v) Implement a social communication program to identify further potential areas/programs that could be supported.

Managing Health and Safety Issues

Gas Wells and Associated Facilities

6.156 Pluspetrol will develop a specific Health and Safety Plan (HSP) for the operation of the gas fields and associated facilities, which will comply with the corporate HS policy of Pluspetrol.

Fractionation Plant and Marine Terminal

6.157 A specific Health and Safety Plan will be prepared for the fractionation plant and the marine terminal, prior to the initiation of operations.

Managing Contingencies

Gas Wells and Associated Facilities

6.158 For the gas wells and the Las Malvinas plant, a detailed Hazard Study (Risk Assessment) will be performed prior to the operation. It will focus on the potential loss or rupture of any device containing contaminating vapors or gases, as well as spills, fire, explosion, earthquakes, floods and other natural events. As a result of this study, a specific Contingency and Emergency Plan for the operational phase will be prepared.

Fractionation Plant and Marine Terminal

6.159 A detailed Risk Assessment is being performed for the fractionation plant and the marine terminal, to analyze all the potential risks associated with each facility, including loss or break of devices containing contaminating vapors and gases, spills, fire, explosions, earthquakes and floods for the fractionation plant and all potential accidents in relation to loading/unloading activities and any rupture of the undersea pipe associated with the terminal, including identification of all potential sources of soil, surface water, or underground water contamination. This assessment will provide the basis for the preparation of the Contingency and Emergency Plan specific for the operational phase.

6.160 Among the principal contingencies that have been addressed in the Contingency Plan included in the EIA are: natural events such as earthquakes, flooding, tsunamis and others; oils and fuels spills, spills of products such as propane, butane, naphtha, JP-5, and diesel, among others; external events such as terrorisms; transportation accidents; accidental release of non-burned and burned NGL; explosion of non-confined gases; failure of compressors, heating systems, refrigerating systems; and leaks and explosions in the internal product transportation lines.

6.161 As for the marine terminal, the principal risks are associated to the loading and unloading activities as well as to ruptures and other failures of the undersea pipelines. The operations of the terminal will follow the recommendations of the International Maritime Organization (IMO). Propane-butane transport vessels have a permanent system whereby ballast water exchange is not required (because it is not discharged), due to the nature of the product (low specific weight). With regard to naphtha carrying vessels, Pluspetrol will require that all vessels be doubled-hulled, and that they comply with the State of California's applicable regulation: "California Ballast Water Management Program" (i.e. ballast water exchange must be carried out 200 miles from the coast and a minimum depth of 2000 m). Vessels sailing national waters only will comply with DICAPI's regulation (*Resolución Directoral No 0178-96/DGC*) of 12 miles from the coast for ballast water exchange. A Risk Assessment and a Contingency and Emergency Plan are being developed based on the results of the spill dispersion model (Refer to paragraph 5.73 and 5.74).

6.3.2 Downstream Component

Managing Environmental Issues

6.162 During operations, the focus of environmental management is on pipeline maintenance activities, pumping and pressure reduction stations, and potential emergencies. The project will develop a detailed ESMP for the operational phase, which will include as a minimum the operational procedures proposed as part of the EIA.

6.163 Environmental procedures will be developed for clearing of vegetation as part of the maintenance of the ROW, maintenance procedures, control of noise and air emissions, water and soil contamination, management and disposal of domestic and hazardous wastes (oil and lubricants), and training of the operational personnel.

Managing Social Issues

6.164 The Community Relations Plan that has been implemented during construction will continue throughout the life of the Project, with the necessary adaptations, given that during operations (with the exception of an emergency event) the level of direct disturbances caused by the Downstream Component will be significantly reduced. During normal operation of the pipelines, the area of direct influence is estimated as a small area adjacent to the pumping and pressure reduction stations. Along the ROW agricultural and cattle raising activities can be developed with minimum restrictions. The Community Relations Department will be responsible for communications to the stakeholders and for the design and implementation of the various components of the plan. TGP will continue consultation and incorporate the information obtained throughout the consultation process carried out during construction, into the operation and maintenance of the Project. Prior to the operation of the Project, the Company is planning a number of meetings with the community leaders to, among other issues, discuss the operation of the Project, describe the Community Relations Plan, and introduce the Company's management team.

6.165 In addition, TGP has developed a number of measures as part of the Migration Control Strategy for the operational phase, including the following: (i) vehicles will not be used on the ROW in the rainforest segment; (ii) maintenance will be performed primarily by air transportation and on foot; (iii) agreements will be signed with local communities for visual inspection of the ROW where TGP will create the "Guardians Group" (*Grupos de Vigilancia*) formed by community members selected and assigned by the community, which will receive training and radio or satellite phones from TGP; (iv) members from local communities will be hired for maintenance activities. Also, TGP is entering an agreement with INRENA to set-up[26] two full-time forest ranger stations to protect the newly created Machiguenga Communal Reserve and the forest ranger stations will have permanent personnel, and radio communications with TGP and INRENA.

6.166 Additionally, TGP will perform a long-term monitoring of land use and regional deforestation on a three-year basis (with the use of satellite images), which will also contribute to the

[26] TGP will provide funding, initial training and initial park ranger salaries until GOP funds are allocated.

identification of any undesired settlement patterns. TGP will inform the appropriate Peruvian authorities of any illegal settlement identified either on the field or by the remote sensing and will provide all the logistics required by GOP to address the situation.

Managing Health and Safety Issues

6.167 TGP developed a specific Health and Safety Plan for the Downstream component, which includes numerous written procedures in connection with maintenance and operational activities, in particular related to occupational health, operational working procedures, use of personal protection equipment, road safety, and inspections and audits, among the most relevant.

Managing Contingencies

6.168 The Contingency Plan for the operation phase, which will describe in detail the necessary measures, procedures, equipment, training, responsibilities, schedules, and resources (including monetary and manpower) required to adequately control, respond and remediate all potential risks and emergencies. Among the principal procedures that will be reviewed and detailed prior to the operational phase is the spillages of natural gas liquids procedure, which considers the rupture of the pipeline.

6.169 The Contingency Plan will be based on a risk assessment in which severity and probability associated with each identified risk was assessed. Among the principal risks associated with the operation of the pipelines are spills of liquids, gas explosions, terrorism, land slides (*huaycos*) and slope failures. Specific procedures were designed to address these risks, based on the US military standards (US-MIL-STD-882), which is based on the following level of priorities: prevention/elimination of risk, protection against risk, minimization of risk, and organization of response to risk.

6.170 The principal prevention system is the pipeline control system SCADA (Supervisory, Control, and Data Acquisition System) that will permanently monitor the pressure and temperature of the fluids inside the pipeline and activate the shut-off valves when it detects a pressure drop, which may indicate a possible leak. In addition, there will be routine inspection of the pipelines for corrosion by the use of intelligent pigs that will measure and register the pipes in order to prevent any possible leaks.

6.3.3 Distribution Component

Managing Environmental Issues

6.171 A preliminary ESMP for the operation of the Distribution component was developed as part of the EIA. It comprises a number of operational procedures to be followed as part of the maintenance and operational activities, in particular in relation to rehabilitation of areas where maintenance works have been completed (including replanting all vegetation that has been removed), appropriate drainage of the areas to be maintained, waste management in maintenance work areas, and water spraying before working in non-paved areas.

Managing Social Issues

6.172 The majority of the social impacts during the operation phase is related to the fear of explosions and fires, and thus can be mitigated through adequate social communication programs. These social communication programs will be developed as part of the Community Relations Plan developed for the Distribution component. The Plan will take into consideration the diverse characteristics of each of the 14 districts crossed by the project, such as the rural activities in Lurin and Pachacamac and the industrial zones in Ventanilla. The social and economic characteristics of these districts will also be taken into consideration.

6.173 The Community Relations Plan for the operational phase focuses in the relation with the consumers and in the communities directly affected by maintenance works and operational activities. It also addresses potential clients; therefore its area of influence goes beyond the immediate area affected by the existing network and it envisages supporting some selected community initiatives.

Managing Health and Safety Issues

6.174 The Project Company developed a specific Health and Safety Plan for the Distribution component, based on a "Zero accident" policy. It includes written procedures for a number of activities in connection with the maintenance and operation of the distribution network, such as signaling prior to start working, barriers and protections to pedestrians, use of personal protection equipment, excavation of trenches, work in confined spaces, among a number of others.

Managing Contingencies

6.175 A Contingency and Emergency Plan for the operational phase of the gas distribution system was developed as part of the EIA. Prior to the operation of the project, this plan will be reviewed and incorporating, as necessary, more specific or additional operational procedures. The plan will be coordinated with the Emergency Plans of all 12 districts that are crossed by the gas distribution network, and the applicable government authorities and other institutions, such as, water and sanitation services, telephone companies, cable TV, electricity distribution networks, and the large consumers and industrial clients. A preliminary Contingency and Emergency Plan was developed based on a preliminary Risk Assessment, which identified the following principal risks, as those with low probability but high severity: gas leaks, explosions and fires. Earthquakes, and flooding are other risks identified and for which detailed procedures will be designed for the operational phase of the project. Spills of fuels and lubricants are not considered to be principal risks during operation, due to the fact that there is no storage or intensive use of these products in the natural gas distribution system.

6.176 The principal mitigation to potential operational risks were incorporated into Project design such as automatic shutting valves, cathodic protection against corrosion, intelligent scrappers, automatic system for leak detection (SCADA), and two independent communication systems (radio and telephone). The SCADA will permanently monitor the pressure and temperature of the fluids inside the pipes and activate the shut-off valves when it detects a pressure drop, which may indicate a possible leak. The block valves will be installed according to the international norm ASME b31.8 of Class 600, along the pipes, at the entrance of each pressure regulation station, before after river crossings, and immediately before each regulator. In addition, there will be routine inspection of the pipes for corrosion by the use of intelligent pigs that will measure and register the pipes in order to prevent any possible leaks.

6.177 A series of communication and risk-prevention programs are being designed and planned in preparation for the beginning of commercial operation, including education and the dissemination of a public awareness of natural gas ("natural gas culture").

6.3 Monitoring and Supervision

6.3.1 Monitoring

Upstream Component

Gas Wells and Associated Facilities

6.178 Pluspetrol has prepared an Environmental Monitoring Plan, which contains the indicators and parameters to be monitored, the monitoring methods and the applicable standard/limits. Sampling and preservation methods recommended in the Environmental Monitoring Plan are: Soil - EPA SW 846, Sampling Plan for Soil Investigation; Surface and Underground Water - EPA SW 846, Sampling Plan for Surface and Groundwater Investigation; Liquid Effluents - Standard Methods, Part 1060; Air Quality - EPA Methods (Ambient Monitoring Technology Information, AMTIC); and Gaseous Emissions - EPA Methods (Emission Monitoring Technology Information EMTIC). Section 3 provides a summary of applicable standards and limits.

6.179 For the seismic exploration, the following aspects were monitored: consumption of fuel, explosive and chemical product; drinking water quality; noise level; transportation used; solid wastes generated at each work camp; fuel storage systems; worker's health conditions and health statistics; adequacy of the blasting points utilized; compliance with minimum distances established by the legislation in force; verification and quantification of clearings/brushwood clear areas and trail widths; and identification and assessment of spills.

6.180 For the well drilling process, the monitoring includes: liquid effluents discharged from mud pits; liquid effluent discharge generated from the drilling platform; consumption of fuel, chemical products and drilling mud; earth movements work and degree of progress; excavation and use of pits, erosion at platforms, trails, and waterway banks; shallow aquifer in pit areas; gas venting; and in the case of burning gases, a monthly monitoring of SO_2, NOx, non-methane hydrocarbons, and particulate material (PM_{10}).

6.181 During construction of flowlines and the gas plant in Las Malvinas, the following aspects are monitored: solid wastes generated at each work camp; discharges from sewer effluent treatment plants; drinking water quality; noise levels; vehicles and heavy equipment used; and consumption of fuel, chemical products and explosive; accidental findings of cultural resources or human remains; work camps and abandonment or closure of slabs; and community relations and compensation measures.

6.182 Since March 2002, Pluspetrol has been developing a program to monitor the long-term effects of the Camisea Project on biodiversity. The Biodiverstity Monitoring program is currently being developed by specialists from the Oxford University (Wild CRU, Great Britain), from the Peruvian Amazon Studies Institute, and La Plata University (Argentina), under coordination of ERM-Environmental Resources Management. The initial scope was submitted to some of the relevant stakeholders for comments.

6.183 During the operation of the gas processing plant, the principal monitoring programs will be air emissions and ambient air quality, liquid effluents, noise, and waste management.

- Air emissions and ambient air monitoring: The proposed air emissions and ambient air monitoring parameters are: SO_2, NO_2, CO, particulate material (PM_{10}) and volatile organic compounds (VOCs).
- Liquid effluents monitoring: The following parameters from industrial effluents will be monitored: pH, phenols, oils and grease, BOD, heavy metals, barium, lead, sulfides and temperature. Treated effluents injected together with production water will be monitored periodically so as to verify that their characteristics will not affect re-injection conditions.
- Noise monitoring: Noise levels will be monitored both within the property boundaries for health and safety issues and at/outside property boundaries to assess potential impacts.

Fractionation Plant and Marine Terminal

6.184 Monitoring programs for air, soil and sediment quality are included in the EIA for the fractionation plant and marine terminal (and the additional studies for the undersea pipeline developed as an alternative to the pier), for both construction and operation phases. A sediment's monitoring program for the construction of the marine terminal (dredging operations) is presently being developed.

6.185 The proposed air emission monitoring will include: CO, SO_2, NO_2, PM_{10} and VOCs. Proposed ambient air quality monitoring will include: CO, SO_2, NO_2, PM_{10}, lead and ozone. Ambient noise will be monitored at the nearest receptors. Liquid effluents will be monitored for: pH, temperature, phenols, oils and greases, BOD, heavy metals and sulfur.

6.186 The marine waters are proposed to be monitored for: temperature, pH, total dissolved solids, BOD, total and fecal coliforms, dissolved oxygen, oils and greases, total hydrocarbons (TPH), phenols, barium, cadmium, chromium, lead, mercury. Sediments will be monitored for heavy metals and TPH. As part of the monitoring associated with the marine terminal, the following monitoring will be conducted: evolution of the coastal line (profile); bathymetry; effectiveness of the maritime traffic plan; and marine biota (benthos, *malacofauna*, zooplankton, phytoplankton and phytoplankton productivity, algae and species of economic interest). During loading and unloading activities marine waters will be monitored for transparency. Compliance with MARPOL Convention will also be monitored.

6.187 The underground water table will be monitored through a network of wells, which will be installed during the construction stage. Two wells will be located upstream and two downstream the plant site, and one central well will be located within the plant site.

Downstream Component

6.188 TGP developed and implements an Environmental and Social Monitoring Plan. The Monitoring Plan for the construction phase aims to verify compliance of TGP and its subcontractors with the Environmental Management Plan and other applicable plans and requirements. Flora and fauna, air quality, noise, water quality, erosion and discharges are monitored routinely. Due to the nature of construction activities, monitoring points are temporary and change routinely. TGP's supervision activities and results are reported on a daily basis and then consolidated into weekly reports.

6.189 Biodiversity Monitoring: TGP has signed an agreement with the National Museum of Natural History to collect biological data during forest clearing activities to further understand biodiversity in the area and contribute to scientific knowledge. This work began in October 2002 and concluded in December 2002. The National Museum of Natural History issued four reports in which the findings and data collected can be found (these reports are published in the Camisea web page). In addition, TGP documents the recovery of the vegetation affected during construction. This information will subsidize decision regarding vegetation species to be used in revegetation. And yet, during the closure process, TGP will document the species planted for each sector, as well as the method used (seeding, cuttings, seedlings), density per hectare and season planted.

6.190 Among a variety of records that are kept by TGP, the Company keeps records of the width of the ROW and surrounding areas affected by the construction of the project at all locations. This record demonstrates compliance with the restrictions on land use, is used for a quantitative and qualitative determination of the flora species removed and to assess the possibility to uses these species for the revegetation program upon closure of the construction phase. Records of ”sightings" of large native animals during the clearing of the ROW are also kept, together with nesting or fauna-gathering sites encountered along the length of the gas pipeline, especially in the highlands and rainforest.

6.191 Deforestation Monitoring: In addition to the Biodiversity Monitoring, TGP developed a long-term deforestation monitoring program to identify changes in deforestation patterns in the area of influence of the Camisea Project. The baseline data for year 2000 (based on satellite images) has been collected, digitalized and mapped. The information will be then updated periodically based on updated satellite images.

6.192 Water Quality Monitoring: Given the importance of the water resources to the local communities in the area of direct influence of the project, the impact of the construction activities on the quality of watercourses is monitored by *in situ* analysis and laboratory testing of samples. The water quality standards of the effluent (discharge) are defined by DIGESA. The water quality standards of the receiving water body are established in the Peruvian General Water Law (*Ley General de Aguas*) of 1999, the World Health Organization or the World Bank (see Section 3.2 for details). The sampling points are located on the principal watercourses crossed by the by the ROW. One sample is taken at each sampling point, 100 m upstream and 100 m downstream of the point where the ROW crosses the river or the wastewater is discharged. At the end of the construction phase, the hydrobiological sampling will identify the condition of the aquatic population at the end of the construction phase.

6.193 Erosion and Sedimentation Monitoring: This monitoring aims at verifying the effectiveness of the erosion control measures and promptly detecting any new erosive processes promptly. The monitoring emphasizes zones identified as presenting medium to high risk of erosion (according to the susceptibility to erosion map in the EIA). Inspections are carried out by road, except where the ROW cannot be reached by land. In these cases inspectors use helicopters and/or boats (e.g., between Malvinas and Chocoriari, the only means of transportation are by either helicopter or boat). The monthly reports contain a specific Erosion Table Checklist, which reports the points where erosion problems were identified.

6.194 Local Community Monitoring Program: TGP implements a Local Community Monitoring Program, which aims at improving the communities' understanding of the Project impacts and generating a sense of ownership and mutual responsibility between the Company and the local communities in the management of socio-environmental impacts. Although the methodology and the indicators are standard and applicable to a number of communities, the aspects to be monitored vary according to the socio-environmental characteristics and the particular interests of each community along the ROW. A number of environmental aspects though, are of general interests, such as water quality in the rivers and creeks, use of areas beyond the limits of the ROW, waste management, and restoration activities. In addition to monitoring of the environmental baseline, the community will also monitor conditions of all social infrastructures that might have been adversely affected by the construction activities, such as fences, roads, and irrigation and drainage systems. Such impacts will be reported and repaired immediately. Moreover, the local population participates actively in the following aspects: reinforcement and monitoring of the "closed camps policy" and overseeing of the ROW during the first stage of construction and the construction interruption in the rainforest during the rainy season (December 2002 to March 2003).

6.195 The detailed monitoring plan for the operational phase of the pipelines will be designed as part of the ESMP for operations. It will detail the proposals included in the EIA and will concentrate on reporting the environmental aspects of the surface installations, especially the pumping stations. In the three-year period immediately after construction, monitoring will also address revegetation and rehabilitation of the ROW and associated areas, and the ecological features (flora and fauna) in the area of influence of the pipeline. The monitoring points will be the same used in the construction phase, as to provide long-term information and identification of environmental trends. During Project operation, erosion, waste generation, atmospheric emissions and noise will also be monitored, as well as training and execution of the contingency plan.

6.196 Erosion Control: Monitoring will verify effectiveness of the erosion control systems implemented during the closure of the construction. It will emphasize zones identified as at medium to high risk of erosion. Inspections will be carried out by road where the ROW can be reached by this means. The remaining areas will be monitored by helicopter and on foot. Once erosive processes have been identified, corrective action will be taken during and after the rainy season in the highlands and rainforest.

6.197 Revegetation and Rehabilitation of ROW and Associated Areas: TGP will monitor *in situ* the effectiveness of the revegetation and rehabilitation processes. In the first year, monitoring will be performed on a quarterly basis. From the second year onward, dependent upon the results of the first year, monitoring will become semi-annual. In addition, an aerial photo of the ROW will be performed on an annual basis, to assess vegetation cover on the ROW and associated areas.

6.198 Terrestrial Fauna: Monitoring of the abundance, diversity and variability indices of terrestrial fauna will identify species present at the end of the construction phase, in particular in the sensitive areas identified in the EIA study (Refer to Table 6.1) and those areas where important species of fauna were detected during monitoring of the construction phase. The monitoring results will be compared with the baseline information and the information generated at the construction phase monitoring in order to evaluate the residual impacts on ecologically sensitive zones. Monitoring will be performed on a semi-annual basis for the

three-year period after construction, and annually thereafter, dependent on the results of the previous monitoring.

6.199 Aquatic Biology*:* The aquatic biological sampling will identify the condition of the aquatic population at the end of the construction phase. This sampling will consist in collecting bentonic organisms (invertebrates) and aquatic insects which act as indicators of the water quality (Ephemeroptera, Trichoptera and Plecoptera). Representative samples of fish will also be taken to determine their diversity and relative abundance.

6.200 Waste Management: TGP will keep a register of wastes produced by the operation of the gas pipeline, including fluids generated by cleaning of the gas pipeline and the liquid and solid wastes generated by maintenance activities. Specific procedures and control forms will be designed as part of the ESMP for operations to ensure proper control of wastes from generation to final disposal, by all parties involved. A wastes inventory will be generated by TGP on a quarterly basis, including the records of all wastes disposed. The information will be reported to the DGAA annually.

6.201 Air Emissions and Noise*:* Air emissions and noise will be monitored at the pumping and compressor stations.

Distribution Component

6.202 The ESMP of the Distribution system includes an Environmental and Social Monitoring Plan for construction and operations. The environmental and social monitoring plan complies with the regulations established by MEM in its *"Reglamento de Proteccion Ambiental en las Actividades de Hidrocarburos*" and subsequent modifications, to be followed by the EPC and all sub-contractors. The plan includes water quality monitoring (temperature, pH, DO, oils and greases, Cd, Cr, Hg, Pb, total coliforms) air emissions (PM_{10}), soil quality (pH, oils and greases, heavy metals) and erosion, and noise monitoring.

6.203 The environmental and social monitoring programs for the operation of the Distribution component by Tractebel that are proposed in the EIA will be detailed in the ESMP for the operational phase. The monitoring program will focus on unauthorized third-party activity on the ROW, maintaining the required pipeline depth, stability of river crossings and leak-detection. A preliminary monitoring program as presented in the EIA includes: monitoring of soil contamination (pH, hydrocarbons, lead and iron), erosion, vegetation cover and integrity of the ROW (particularly in the non-urbanized areas), and water quality downstream water crossings (temperature, pH, DO, total dissolved solids, chlorine, oil and grease, cadmium, lead, mercury and chromium). In addition, an air quality monitoring will be performed to detect any potential releases of natural gas (principally methane) at the city gate, terminal station, and pressure regulation stations and pipeline connections.

6.4.2 Supervision

6.204 There are several levels of monitoring of the three components of the Camisea Project, involving the project Companies, the GOP, communities and third parties.

6.205 Government: There are various GOP entities involved with the supervision and monitoring of the Camisea Project. As part of the IDB public sector loan, the GTCI (Technical Group for

Institutional Coordination of the Camisea Project) was established to coordinate the efforts of all the governmental agencies involved in oversight, monitor and control of the Project.

6.206 OSINERG is governmental entity responsible for the supervision and monitoring of the Camisea Project, regarding compliance with environmental and social aspects and other hydrocarbon regulations. OSINERG has up to 15 environmental/social supervisors in the field permanently moving along the ROW and upstream facilities. OSINERG supervision is being supported by the IDB public sector loan, and includes preparation of supervision reports on a monthly basis.

6.207 Several governmental entities are also visiting the project site periodically: Ministry of Energy and Mining (including DGAA, DGH, DIGESA), Ministry of Health, INRENA, Ministry of Agriculture, SETAI (Technical Secretariat for Indigenous Matters), Ministry of Transportation, Ministry of Defense and the INC (National Cultural Institute).

6.208 The Ministry of Energy and Mining has created the Ombudsman for the Camisea Project in order to prevent conflicts and resolve concerns specifically exclusively to social and environmental aspects. This enhancement is part of the IDB Institutional Strengthening of GOP loan. The ombudsman is in addition to the existing national ombudsman (*Defensoría del Pueblo*).

6.209 Downstream Company: TGP hired Knight Piésold (KP) to perform an independent supervision and monitoring of the environmental and social aspects of the pipeline construction. This consultant was selected through a thorough bidding selection process involving several potential pre-selected prestigious companies. Integrity of this consultant is based on its own need and requirement to have independence in order to accept this task, subject to its headquarters audits and governmental permits to operate as such. There are approximately 13 monitors in the field constantly. KP uses a checklist to gather information pertinent to the performance of the activities being conducted in the field and to monitor compliance with the environmental commitments and measures in the EMP. Monitoring includes flora and flora, air monitoring, emissions monitoring, surface water monitoring, erosion control measures, waste management issues and archeology. Monthly reports are available to project stakeholders via the Camisea Project website (http://www.camisea.com.pe) and are sent to governmental authorities.

6.210 TGP has contracted Ecotec S.A. to monitor the archeological aspects, including during all initial clearing and grading operations and has the authority to stop construction activities in archeological resources are identified. Ecotec has had up to 50 archaeologists in the field and works with 13 archaeologists from the National Institute of Culture on the identification of sites, rescue of artifacts, and identification of routing changes. Reports are prepared on a weekly and monthly basis.

6.211 TGP staff is also directly monitoring the construction phase to assess compliance of its subcontractors with the Environmental and Social Management Plan and other applicable plans and requirements. For environmental areas, this includes an Environmental Manager, two Environmental Supervisors and nine Environmental Inspectors. TGP supervision activities and results are reported on a daily basis and then consolidated into weekly reports. TGP is presently performing continual inspections of possible erosion and sedimentation. For social areas, TGP has contracted Social Capital Group to support the implementation of the

Community Relations Plan that includes negotiations for the ROW, receiving affected people complaints and coordinating solutions (e.g., with supervisors, contractors, etc.). Social Capital Group has approximately 18 people to perform these efforts.

6.212 In addition, Gulf Interstate, TGP's owners engineer, has 2 environmental inspectors and 2 erosion control consultants to monitor the project.

6.213 Techint, the construction contractor for the pipeline has its own Environmental Health and Safety Management (SESMA) and has at least 6 environmental inspectors in the field.

6.214 Upstream Company: The implementation of measures established in the Environmental Management Plan for the gas fields and associated facilities are monitored by an independent third party. Pluspetrol has retained the consulting firm *Energia y Medio Ambiente SRL* (EMA) as an independent consultancy company responsible for environmental and social monitoring of all field activities during construction phase in relation to the aspects referred to above. Monthly reports are posted in the Camisea web page. EMA has various staff in the field to monitor construction activities full-time, including: erosion control measures; flora and fauna protection measures; solid and sanitary wastes management; hazardous material management and disposal; air quality protection; leakage prevention, contention and control measures; construction practice; accidental findings of cultural resources or human remains; work camps and abandonment or closure of slabs; and community relations and compensation measures. A monthly report is prepared by EMA and sent to the Ministry of Energy and Mines (DGAA) and posted in the Camisea web page.

6.215 Community Environmental Monitoring Program*:* A Community/Participatory Environmental Monitoring Program was initiated during the second semester of 2002 for the Upstream component and the rainforest section of the Downstream component. The objective of this program is to get the local people involved in the monitoring activities as well as to give transparency to the program. Two rounds of workshops were held with the native communities. In the first round, 8 workshops took place with the participation of 271 people. In the second, one workshop was carried out in which 2 to 4 people from each native community were selected to continue with the program. The NGO Pro Naturaleza participated in the preparation of the Program and training of the community monitors. The GOP is presently coordinating the local monitors.

6.216 In addition, following recommendations of IDB and other stakeholders, Pronaturaleza and RAP (*Red Ambiental Peruana*) expanded the Community Monitoring Program to include permanent monitoring of the works performed within the area of the Nahua –Kugapakori reserve. The results of this monitoring will be posted in the GTCI Camisea web page on a monthly basis.

6.217 IDB Environmental and Social Independent Monitoring*:* Since the early stages of the environmental and social due-diligence of the IDB and CAF, the Project is under independent monitoring performed by URS Corporation. Although the IDB monitoring focuses in the Downstream portion of the Project, which is under consideration for financing by the Bank, it also covers the Upstream component. The main objective of the IDB Independent Environmental and Social Monitoring (IESM) is to provide the Bank and other stakeholders with reliable independent information with regard to the Project's compliance with the environmental and social management requirements. The IESM monthly reports are placed in

the Camisea web page, thus providing an additional opportunity for interaction between the Bank and the Project stakeholders and affected people. The updated information in the web page also contributes to enhance the Project's supervision and enforcement of environmental legislation by the government agencies in Peru. URS will continue to perform an independent monitoring of the Project for the life of the IDB loan.

6.218 The IESM comprises two local and Spanish speaking monitors - 1 environmental and 1 social, and 2 international environmental and social quality control supervisors. The environmental monitor is based, alternately, in Nuevo Mundo and Pisco, and covers both the Upstream and Downstream activities, the campsites, the San Martín 1 field, the seismic campsite of Veritas, the ports and docks and the pipeline ROW from Malvinas to Pisco (and Lima, when construction starts in the coast). The social monitor is based, alternately, in Nuevo Mundo and Pisco, and covers the entire project ROW and Upstream activities. Both monitors report to IDB on a daily basis and prepare monthly reports that are disclosed in the Camisea web page. All identified non-compliances are immediately reported to TGP for corrective actions and follow-up on corrections is performed on a weekly basis.

6.5 Resources for Environmental, Social and Health and Safety Management

6.219 All three Project Companies (TGP, Pluspetrol and Tractebel) have designated resources to manage the environmental, social, and heath and safety aspects of the Camisea Project. Upon IDB recommendations during the environmental and social due-diligence, the project companies established the Camisea Environmental and Social Coordination Committee. The committee meets on a weekly basis to review status and coordinate on environmental, social, health and safety, and communications aspects of the Project.

6.220 All three Companies have established integrated environmental, social and health and safety management systems. The three systems have been designed with the same structure and principles, and are compatible with ISO 14001. The management structure consists of:

- An Environmental and Health and Safety Manager;
- A Community Relations Manager;
- An Environmental Unit, with an Environmental Supervisor and several environmental specialists;
- A Health and Safety Unit with a Health and Safety Supervisor; and several Health and Safety officers; and
- A Community Relations Unit, with a Community Relations Supervisors and several community relations coordinators.

6.221 In addition, the principal Contractors have their own structure for environmental, health and safety management.

6.222 In TGP, the Community Relations coordinators are divided in three groups to cover the rainforest, the highlands and the coast. There are 28 Community Relations coordinators in total, being 1 general coordinator, 3 section coordinators (for the rainforest, highlands, and coast sections), 5 coordinator in the coast, 11 coordinators in the highlands, and 8 coordinators in the rainforest.

6.223 The environmental management structure in TGP includes 2 Environmental Supervisors, 8 Environmental Inspectors, 5 Monitoring Coordinators, and 1 Archaeology Coordinator (in addition to the field personnel from the National Institute of Culture - INC).

6.224 In Pluspetrol, the environmental management structure includes 2 Environmental coordinators (1 in Lima and 1 in Las Malvinas), and 4 supervisors in Las Malvinas. The Community Relations structure includes 2 Community Relations (1 in Lima and 1 in Malvinas) and 9 Community Relations liaisons in the field.

6.225 For the Downstream component, the financial resources allocated to the development and implementation of the environmental, social and health and safety management plans are estimated at approximately U$35 million during the construction phase (Estimated up to August 2004). As of June 2003, approximately U$8 million has been spent in the implementation of the environmental and social and health and safety management plans, of which about U$6.5 million on environmental and social supervision and monitoring; close to U$650 thousand (of an estimated total of U$ 3 million) in development programs to local communities, NGOs and government institutions; U$ 300 thousand on consultation and communication; U$385 thousand on River transportation Plan; U$300 thousand on revegetation (of an estimated total of U$2 million); U$99 thousand for the Road Transportation Plan; U$50 thousand under the agreement with Cusco's Regional Direction of Health (of a total of U$80 thousand); and U$ 14 thousand (of an estimated total of U$ 314 thousand) for the implementation of the forest rangers control stations, among the principal.

6.226 In addition, TGP's selected route of the pipelines to avoid the passage through the then Apurímac Reserved Zone (currently National Park Otishi and Communal Reserves Machiguenga and Ashaninka) has increased the project costs in approximately U$104 million, in comparison to the original route that had been selected by GOP. The construction of the NG and NGL pipelines through the rainforest with an additional capacity (to minimize impacts of increasing the pipelines capacity to meet future demands) has cost some additional U$42 million.

6.227 As part of the Downstream and Upstream license agreements, both TGP and Pluspetrol have been required to establish performance bonds associated with the construction of their respective components. These bonds are available for use by the GOP for failure to comply with the license agreements, including in particular non-compliance with (i) Peruvian environmental, social, and health and safety regulatory requirements, and (ii) environmental, social, and health and safety plans and procedures established as part of the EIA approval process. The value of these performance bonds are: U$92 million for construction and U$2 million for operation of the Downstream (TGP); U$99 million for construction and U$5 million for operation of the Upstream (Pluspetrol).

6.6 IDB Public Sector Loan for the Institutional Strengthening of GOP

6.228 The environmental and social due-diligence of the three components of the Camisea Project identified some potential medium to long-term negative effects as a result of the project's implementation that are not controllable by, nor the responsibility of the project companies alone, but rather would require GOP action. In this regard, the IDB developed, in conjunction with the GOP, and approved a program for Institutional Strengthening and Environmental and Social Management Support for the Camisea Gas Project. The IDB Public Sector Loan

(1441/OC-PE) was signed on February 27, 2003, and contains two principal components: (i) development of the institutional capacity of Peruvian government entities directly involved in Camisea Project (institutional strengthening component); and (ii) priority studies and activities to mitigate the project's indirect negative environmental and social effects that are Government's primary responsibility (priority studies component).

6.229 The institutional strengthening component (U$5.6 million) aims at supporting and enhancing the technical capacity of the several government agencies directly involved the inspection, supervision, and monitoring of the environmental and social impacts of the Camisea Project. The IDB resources finance consultants, technical support, vehicles, capacity building activities, and specialized technical assistance, for the GTCI (the inter-institutional coordinating committee for the Camisea Project) and for each of the GOP institutions involved in the Project. The principal activities included in this component are:

(i) Support to GTCI: The program finances consultants to strengthen its coordinating capacities, develop a community outreach and public consultation strategy, including a web page, and strengthen GTCI's participation in the community monitoring program that is implemented with the participation of NGOs, local communities and local and regional governments;
(ii) Support to OSINERG: The program supports OSINERG's increased presence of full-time monitors in the field. The program also finances capacity building and public consultation activities in connection with the monitoring of the Camisea Project. Currently OSINERG has 15 monitors permanently in the field.
(iii) Support to DGAA/MEM: The program finances social and hydrocarbon specialists to develop environmental and social monitoring guidelines and protocols, including supervision of the implementation of the environmental management plans and the Community relations Plans by the Project Companies.
(iv) Support to INRENA: The program finances consultants to review and enhance the baseline data for the monitoring of natural resources in the protected areas and communal reserves within the area of influence of the Camisea Project.
(v) Support to CONAPA: The program finances consultants to review and enhance the existing protocols to deal with indigenous peoples (including those in voluntary isolation) prepared by the Project Companies, and to develop negotiation and conflict resolution capabilities within CONAPA's personnel.
(vi) Support to CONAM: The program finances consultants to develop inter-sectoral coordination mechanisms and public participation mechanisms, on a national basis.
(vii) Support to DIGESA: The program finances consultants to support the development of a comprehensive water quality plan, including standard criteria, sampling points and frequency, laboratory analysis, and systematization of data.
(viii) Support to DGC: The program finances consultants to develop access control strategies and ensure adequate maintenance condition of the existing roads affected by the Project.

6.230 In addition, this component finances (i) the initial studies for the implementation of a Camisea Environmental, Social and Economic Regional Development Fund; and (ii) the implementation of an ombudsman specific for the Camisea Project.

6.231 The Camisea Environmental, Social and Economic Regional Development Fund has been conceived using royalties from the project and with contributions from the project companies,

in order to help promote equitable distribution of economic benefits from the Project to regions in the area of influence of the Project. The design and preliminary structure of the Environmental, Social and Economic Regional Development Fund and the pre-investment studies necessary to develop projects to be further submitted to the Fund are financed with approximately U$1,4 million from this component.

6.232 The Priority studies component (U$1.09 million) includes studies and investments that were identified by IDB as necessary and priority to prevent and mitigate medium and long-term induced impacts of the Camisea Project, such as uncontrolled colonization, increased illegal logging and settlement in protected areas, among others. Among the key priority activities that were identified for support by the program are the following:

(i) Final categorization, and implementation of final management plans for the Vilcabamba National Park areas and communal reserves Ashaninka and Machiguenga, including land titling activities;
(ii) Categorization of additional protected areas and communal reserves in the areas of influence of the Project, including the Megantoni Sanctuary and the Nauha-Kugapakori reserved areas;
(iii) Development of a Land Use Plan for the area of influence along the pipelines that cross the departments of Ayacucho, Apurímac, Huancavelica, Ica, Lima and Cusco;
(iv) Control of the Lower Urubamba against the access of illegal loggers and settlers. Such control points will be established both in the Upper Urubamba and the zone currently under concession for forestry exploitation. This includes land titling activities;
(v) Development of sustainable development plans for the area of influence of the Project in Cusco, Ayacucho and Pisco; and
(vi) Implementation of a preventive health campaign for the isolated communities in Santa Rosa de Serjali (Nahua), Marankiato, Montetoni (Nanti) communities and others identified during the life of the public sector loan. These activities will complement the health programs that were established between the Ministry of Health and the Project Companies, which focus on the local communities within the area directly affected by the Project.

6.233 In relation to the GOP's enhanced institutional capacity, the results of the IDB Public Sector Loan and work in progress include as part of the Institutional Strengthening Component: (i) GTCI is fully operational as is the GTCI web page; (ii) GTCI is coordinating the community monitoring program that is being implemented within the Nauha-Kugapakori reserved area by the NGOs Pro-Naturaleza and Rede Ambiental Peruana (RAP); (iii) OSINERG has 15 monitors permanently in the field; (iv) a rapid social assessment of the areas of Block 88 within the reserved areas for the Nahua-Kugapakori groups and a first report is completed, as part of the preparation of a protocol of relation with non-contacted indigenous groups, which constitutes the framework for interaction between the state and non-contacted communities; (v) a number of consultants for the several governmental agencies involved in the Camisea Project are undergoing the selection process; and (vi) the GOP has selected the Catholic University as the Camisea ombudsman, and has implemented a number of workshops and seminars to disclose the information regarding the Camisea ombudsman.

6.234 As part of the priority studies component: (i) approval of the decree establishing the legal protection of the Reserved Zone of the Apurímac, through the creation of Otishi National Park and communal reserves Ashaninka and Machiguenga (*Parque Nacional Otishi y Reservas Comunales Ashaninka y Machiguenga*), in January 2003; (ii) an agreement with the Land Titling program, which is also financed by IDB, has been reached as to assign priority to the land titling of the areas surrounding the park and the communal reserves, as well as the Megantoni Santuary; (iii) a forestry control plan is completed, which will allow the implementation of technical measures, monitoring requirements and forest ranger posts, in order to avoid illegal logging, prevent colonization and protect biodiversity in restricted areas of the Lower Urubamba area; (iv) a territorial land use baseline is completed, which will be the basis to establishing a sustainable development plan to identify regional priorities and possible investments; and (v) the initiation of studies and consultancies in the Megatoni/Machiguenga area and the Nahua-Kugapakori reserved area, which will determine the categories and necessary levels of protection, as well as the management, control and monitoring plans required to consolidate these protected areas that might be affected by Camisea Project.

7.0 INFORMATION DISCLOSURE AND PUBLIC CONSULTATION

7.1 The Public Consultation process for the Camisea Project began in the year 2000 as part of the development of the EIA studies for the Upstream and Downstream Components. The consultation and participation process for the Project as a whole has engaged thousands of stakeholders in what is considered as the most extensive public consultation process known for a proposed industrial project in Peru. Over 400 consultations have taken place with the Government of Peru, local and international non-governmental organizations (NGO's) and most importantly with the locally affected communities in the direct and indirect influence of the project. Several dozen individual meetings have been held with the GOP, local, national and international NGO's, private, and public organizations in Peru and internationally.

7.2 The consultations developed as part of the EIA process of this project include a total of eleven government public hearings between September 2001 and March 2002, over four hundred meetings, presentations and workshops with local communities (166 in the rainforest region, 139 in the Andes region, and 120 in the coastal region) between April 2002 to early-2003, and thirteen public consultations in connection with the Inter-American Development Bank. In addition, consortium partners hold quarterly meetings with international NGO's to address their concerns.

7.3 Following suggestions from the IDB, the Project Companies are implementing a multi-faceted social communications program with the objective of improving transparency and dialogue with both local and international stakeholders as well as facilitating a better understanding of the key components of the Project. The TGP, Pluspetrol and Tractebel social communications strategies regard the consultation of direct and indirect stakeholders of the Camisea Project to be an important tool in managing and correcting environmental, social, health, safety, and labor project-related problems and in promoting positive and ongoing relations with the communities and other interest groups. In compliance with Peruvian regulatory requirements and in the best interest of the Project, the Companies are committed to implementing an open, transparent, and continual process of consultation, participation, and disclosure of information with all stakeholders throughout the life of the Project. These

objectives are implemented as part of the Community Relations and Participatory Programs developed for the Upstream and Downstream Components and are consistent with national requirements and internationally accepted practices and strategies. The Companies' have focused their communication's strategy on:

- Improving access of information on the project website (www.camisea.com.pe), informational materials, etc.;
- Strengthening the engagement of the local stakeholder communities and NGOs in the project (site visits, etc.);
- Providing timely information about corrective actions being taken in response to stakeholder concerns; and
- Providing a direct feedback mechanism allowing interested parties to raise issues and get answers to questions on a timely basis.

7.4 TGP, Pluspetrol, and Tractebel have formed a Communications Committee that holds weekly meetings to discuss common communications issues, mechanisms to improve these, project image, and methodologies to implement public outreach activities and improve coordination and implementation.

7.5 During 2002, Pluspetrol and TGP implemented the Community Environmental Monitoring Program (PMAC) with the participation of the local population, representatives of native communities and rural settlements. All participants of the PMAC live in the Project's direct area of influence, primarily in the Lower Urubamba. The implementation of the PMAC has also allowed for community monitors, in representation of their communities, to express their opinions about the project. These concerns are then communicated to the Companies and responded to in writing. This mechanism has generated a written communication practice between the Project companies and the communities regarding their concerns over potential impacts generated by project activities in the Lower Urubamba.

7.6 Table 7-1 provides a summary of the public consultation events that took place for the Upstream and Downstream Components of the Camisea Project during the development of the EIA and SIA and prior to the submittal of the final reports to the Ministry of Energy and Mines, the National Institute of Natural Resources (INRENA), and relevant regional branches. Annexes B and C provides a summary of additional public consultation activities subsequent to the EIA approval process for the Downstream and Upstream Components, respectively.

7.1 Upstream Component

7.1.1 Gas Extraction and Processing Facilities

7.7 The EIA for the extraction and processing facilities was developed using a participatory rural appraisal methodology involving extensive discussions and consultations with local communities (see Table 7-1). The EIA was made available to the public upon formal submission to the DGAA on August 17, 2001. According to Peruvian law, the public response period lasts three months (in this case, until Nov. 17, 2001). However, on September 17, 2001 during a public hearing in Camisea, two indigenous federations (COMARU, the regional Machiguenga federation, and AIDESEP, one of the confederations representing national native communities) formally requested the DGAA to grant the project stakeholders an

additional 90 days to review the materials. After considering the request, the DGAA granted the indigenous federations the extension, starting the date of the request, extending the review period to December 17, 2001. The EIA was also made available on the Camisea web-site and the IDB offices in Peru and Washington. Three formal public hearings on the EIA were held sponsored by the GOP, in addition to various individual meetings by the company.

7.8 The Community Relations Plan developed as a result of the Social Impact Study (part of EIA) is largely focused on building socially and culturally adequate relationships with local populations, both indigenous and non-indigenous, living in the direct area of influence of the Project. Consultation and participation strategies are defined in models designed to facilitate or control interactions, relations, dialogue, consultations and participation with local populations and to ensure that the concerns, preoccupations, and recommendations of these peoples are genuinely incorporated into the execution of the different components of the project.

7.9 Annex 1 of the Directorial Resolution issued by the Ministry of Energy and Mines, as part of the license contract, holds Pluspetrol accountable to the native communities social observations to the EIA throughout the entire life of the project. In addition, the company has committed to annually revising its Community Relations Plan, designed to sustainably manage the potential social impacts of the Project, and to allow the native peoples to participate in the supervision and monitoring of the environmental and social impacts of the Project; with the submittal of all agreements, commitments, and covenants reached between the native communities and the company to the Government.

7.10 In 2002, Pluspetrol executed a consultant agreement with the NGO ACPC (*Associación para la Conservación del Patrimonio Cutiverini*) to evaluate and learn the local population's perceptions of the execution of the different components of the Camisea Project. This consultant agreement was executed with the active participation of the indigenous federations COMARU, CECONAMA and FECONAYY, the first two Machiguengas and the third one, Yine. The information provided allowed the project to refine the communication strategy implemented by the Native Communities Department of Pluspetrol and therefore provide continuous and timely information to the 22 native communities located in the area of influence of the project.

7.1.2 Fractionation Plant and Marine Terminal

7.11 The consultation process for the fractionation plant and marine terminal began in the Pisco/Paracas area in March of 2002, parallel to fieldwork activities that were being conducted as part of the Alternative Analysis Study and the Social Impact Study. ERM's social team have been conducted workshops in the project area of influence to inform local stakeholders of the characteristics of the Project, particularly regarding the design, alternatives, difficulties and tradeoff's involved with the different sites and to learn about their concerns regarding it's potential impacts.

7.12 Based upon a review of the initial Alternative Analysis study, the IDB recommended the study be enhanced and a more through public consultation process be implemented. Pluspetrol modified the study and expanded the public participation process. Fourteen additional consultation meetings were held between September 2002 and January 2003, (in addition to the 10 previously held, including three as part of the IDB public consultation process held in August 2002). Additionally, GOP held two public hearings in Ica on January

27 and 28, 2003. Subsequently, between February and April 2003, Pluspetrol held approximately 14 additional meetings in Pisco, Ica, San Andres, Paracas and Lima. Annex D presents the pre-EIA and EIA public consultations held for the fractionation plant and marine terminal.

7.13 The EIA for the Fractionation Plant and Marine Terminal in Playa Lobería (Pisco) was submitted on November 8, 2002. The EIA included an alternative site analysis that supported the selection of the Pisco site among 14 others that were studied. Upon observations received from INRENA, DGAA, IDB and other stakeholders, modifications were made to the original design, substituting the proposed berth for a submarine pipe. A revised EIA, addressing the comments made by INRENA to the alternative site analysis and incorporating the new submarine pipe was re-submitted on November 19, 2002. The EIA was also made available on the Camisea web-site and the IDB offices in Peru and Washington.

7.2 Downstream Component

7.14 TGP's public participation mechanisms followed the Participatory Rural Appraisal (PRA) methodology developed as part of developing the social impact assessment included in the EIA. It is based on promoting the active participation of the local populations in workshops, training seminars, and other project-related activities (see Table 7-1 for list of events). Between April and December of 2002, TGP's consultation program consisted of 53 information workshops on the progress of construction and 42 meetings regarding social and environmental monitoring (community monitoring) in the rainforest area.

7.15 The EIA was made available to the public, as part of the formal submittal to the GOP, in September 2001. Following four formal public meetings and various individual meetings, the EIA was approved by the MEM. The EIA was also made available on the Camisea web-site and the IDB offices in Peru and Washington.

7.16 A total of 58 visits and information meetings were held with local communities during the initial months of 2003 (see Annex B for examples). The large increase in meetings is due to the start of the workshops associated with the Local Development Program during the month of January. All visits and meetings are scheduled and communicated to the communities well in advance by means of radio and/or written requests. Most workshops have been documented on paper and by video, clearly demonstrating the commitments and agreements that have been made.

7.17 Specific community relation's officers are responsible for maintaining continuous contact with the local population in this segment (rainforest). In addition, the Local Development Program Coordinator collaborates with the community relation's team to facilitate ongoing workshops with the communities.

7.3 IDB Public Consultation and Participation Plan

7.18 The objective of the IDB Public Consultation and Participation Plan (PCPP) for the Camisea Project is to help ensure that all directly and indirectly affected peoples, as well as the Bank, are adequately informed of the potential direct and indirect, short and long-term cumulative, positive and negative impacts of the Project as a whole. The principal objective of the plan was to provide an opportunity to inform stakeholders about Project activities and for the IDB

to receive input and opinions regarding the environmental, social, and health and safety aspects of the Camisea Project. The Plan was specifically developed with an emphasis on: (i) utilizing culturally and socially acceptable communications methodologies; (ii) promoting disclosure and transparency of up-to-date project-related information to project stakeholders on a routine basis; (iii) promoting ongoing and transparent dialogue between the Bank, the Project Companies, and the stakeholders; (iv) increasing awareness among the affected peoples, particularly among the most vulnerable populations (indigenous and rural communities), of their legitimate rights within the context of the Project; (v) providing the affected peoples an opportunity to ensure the environmental and social sustainability of the Project by actively participating in the monitoring and mitigation of project impacts; and (vi) ensuring the adequate implementation of environmental, social, occupational health and safety, and labor management practices.

7.19 As part of the plan, the Bank developed a comprehensive analysis of the Camisea Project stakeholders (Stakeholder Analysis) to determine the different actors, levels of influence, and interests involved in the Project. The PCPP for the year 2002 was divided into two main activities: (i) the implementation of public consultations in indigenous, rural, and urban centers located in the direct influence of the Project in Peru; and (ii) the implementation of a public consultation in Washington DC, specifically organized for the international stakeholders. Each activity had assigned to it a specific calendar of events (in the case of the public consultations held in Peru) schedules, programs, methodologies, documents, and associated costs and logistical operations. The Project Companies and pertinent Government Agencies responsible for presenting the Project characteristics and impacts and answering comments and concerns from the stakeholders at each consultation were also asked to supply maps, wall posters and handouts describing the status of project operations according to each portion and component of the Project. In addition, two translators and two moderators, one Machiguenga for the rainforest portion and another in Quechua for the highlands portion respectively, were hired to help in the implementation of the consultations.

7.20 The methodology used throughout the public consultations involved creating a participative, culturally and socially respectful open dialogue between the parties, guided and facilitated by the respective moderators (and translators when requested). All project related information prepared as part of the public consultation process was translated into both Spanish and English and distributed to over 300 invites (250 in Peru and 50 in the US) by fax, email or mail delivery at least twenty days prior to each consultation. Announcements were also printed or communicated in anticipation via local, regional and national newspapers (20), television (3) and radio (8) stations and posters (for specific interest groups in universities and research and investigation centers) for the consultations held in Peru. This highly publicized campaign ultimately resulted in the participation of over 1,500 individuals or entities across Peru and in Washington DC combined. The PCPP was developed subsequent to holding various meetings with Project stakeholders both in Peru and in Washington DC, and integrating inputs, comments and concerns related to the Project into the design of the Plan.

7.21 A total of 13 IDB public consultations were held during August 6-26, 2002 along the entire Project direct area of influence in Peru: 7 in indigenous and rural communities located in the rainforest and highlands portions of the Project and 6 in the urban centers, primarily located along the coast. The consultations in urban centers included Pisco, Ica, Ayacucho, Huancavelica, Cusco, and Lima. Consultations in native and rural communities of the Bajo and Alto Urubamba involved the native communities living near the seismic and exploitation areas,

and pipeline right-of-way areas in the rainforest (communities of Nuevo Mundo, Camisea, Kirigueti, Segakiato, Kiteni, Kepashiato, and others); communities living in the Bajo Urubamba along the pipeline right-of-way (Timpia, Chokoriari, Camana, and others); and rural communities along the highlands and coast pipeline routes (San Miguel, Huancavelica, Rumishaca, and Canete, among others). Participants represented: peoples directly and indirectly affected by project operations; other members of civil society interested in the benefits and outcomes of the project; members of local, regional or national governments, chiefs of indigenous federations; presidents of native and rural communities; local, regional, national or international NGO's; representatives of multilateral institutions; members of national and international press associations; and representatives of the Project Companies and other consortium companies.

7.22 The consultation held at the IDB Headquarters in Washington, DC was on October 24, 2002 and gathered 102 members representing the international stakeholders of the Project interested in discussing and commenting on the technical, environmental, social, health and safety and labor management practices being implemented as part of the Project. A summary of the results was made available to the public.

7.23 Comments and recommendations raised by the stakeholders regarding environmental and social non-compliance or other issues have been documented, analyzed and communicated by the IDB to the Project Companies or Government of Peru for follow-up action. These recommendations have been closely followed by the Bank, and have in many cases required changes in the environmental and social management structure of the project and in encouraging and supporting the GOP to take greater participation, coordination and involvement in the Project.

7.24 As part of the PCPP, the IDB has continued a proactive dialogue with local and international stakeholders, including various NGOs, during 2002 and 2003 in order to understand potential concerns and help promote solutions such that the Camisea Project is environmentally and socially sustainable.

8.0 RECOMMENDATIONS

8.1 The Camisea Project is located in areas of extremely rich and diverse environmental and social characteristics that warrant very special attention and could be significantly negatively impacted if the Camisea Project is not properly developed, constructed and operated. Thus, as part of the IDB's through consideration to provide financing to only the Downstream Component, the IDB has taken extensive actions in order to ensure the environmental and social sustainability of the project and improve stakeholder participation, including (Table 1-2 for summary): (i) an extensive environmental and social due-diligence (i.e., over 16 months) of all three project components using various IDB internal and external specialists; (ii) requiring numerous improvements in terms of environmental, social and health and safety mitigation and monitoring for all Camisea Project components; (iii) requiring expanded analysis of potential impacts and risks; (iv) requiring increased information disclosure, public consultation and civil society participation; (v) requiring enhanced supervision during construction, including independent monitors, community monitors, GOP monitors and IDB monitors, each of whom are full-time in the field; and (vi) in conjunction with the GOP the development and

implementation of a loan (1441/OC-PE) to enhance the GOP institutional capacity to supervise the environmental and social aspects and to address priority activities that are the GOP's responsibility to mitigate potential indirect effects. Associated with the Camisea Project, there has been extensive participation of civil society, including local Peruvian indigenous and non-indigenous communities and organizations, and Peruvian and international non-governmental organizations (NGO's). This participation has been extremely helpful in identifying negative and positive aspects and has resulted in various improvements and changes in the Camisea Project. This civil society participation was an integral part of, and significantly contributed to, the IDB due-diligence.

8.2 This section presents a summary of the environmental and social requirements proposed for the Camisea Project, including specifically the:

- Standard environmental and social requirements for IDB private sector projects that would be applicable to the Camisea Project (Section 8.1);
- Additional project-specific requirements for the Camisea Project (Section 8.2); and
- IDB plan for supervising the environmental, social and health and safety aspects of the Camisea Project (Section 8.3).

8.1 Standard IDB Private Sector Environmental and Social Requirements Applicable to the Camisea Project

8.3 The financing of private investment in infrastructure and capital markets by the Private Sector Department (PRI) of the Inter-American Development Bank (IDB) must comply with all applicable environmental, social, and health and safety related IDB policies and procedures. The PRI is committed to ensuring that each project is assessed, approved and monitored with due regard to environmental, social and health and safety aspects, that each project is environmentally and socially viable and sustainable, and all project-related impacts and risks are adequately mitigated or controlled. This section summarizes the standard environmental and social requirements associated with the project financing by the IDB of large-scale infrastructure projects, which will be applied to the Camisea Project.

8.4 The Project Loan Agreement (legal agreement) between the IDB and the project company establishes the specific environmental, social, health and safety, and worker rights requirements ("environmental and social provisions") applicable to the project. The purpose of these provisions is to ensure compliance with applicable in-country legal requirements, compliance with applicable IDB requirements, and mitigation of project-specific environmental, health and safety impacts and risks.

8.5 The fundamental environmental and social provision is for each environmental party to comply with all environmental and social requirements such that all project-related impacts and risks are adequately mitigated or controlled. An environmental party is defined in relation to the project, as the project borrower, sponsor, construction contractor, operator, or any company or person working for the project. Environmental and social requirements are, in relation to environmental, social and health and safety matters: (i) all requirements required by any applicable law, (ii) any governmental approval related to any law, (iii) requirements established in project environmental and social plans, and (iv) fundamental principles and rights at work.

8.6 Environmental and Social Plans are the principal mechanisms that are used by the IDB in order to ensure that all project environmental, social, and health and safety impacts and risks are adequately mitigated. These plans must be in form and substance satisfactory to the IDB, and effectively implemented. These plans are categorized into four types as described below, however for a given project these plans may have different names and/or be presented in one or more different documents (e.g., various project-specific plans/documents may comprise an individual IDB environmental and social plan; or more than one IDB environmental and social plans may be presented in one project-specific plan/document):

- *Environmental and Social Management Plan* or *ESMP* is either one plan covering both the project construction and operation phases or two separate plans, one for each phase, which describe the actions necessary for each environmental party to comply with all environmental and social requirements (other than those actions described in the Health and Safety Plan, the Contingency Plan or the Spill Prevention and Counter-Control Plan). The plan shall include: (i) a detailed description of all necessary environmental and social mitigation measures and monitoring activities, including those measures and monitoring activities defined in the Environmental Impact Assessment, any relevant authorization issued by any authority, or otherwise under any applicable law; (ii) a statement of the estimated cost, time schedule and assignment of responsibility for implementing each mitigation measure and monitoring activity; (iii) a description of the specific project supervision methods to be implemented to ensure that all measures and programs are completely and properly implemented by all responsible parties; (iv) a description of the planned environmental, health and safety management system; (v) a reference to other project environmental and social plans; (vi) a description of routine reporting actions within and between environmental parties; and (viii) a description of ongoing activities to ensure adequate information disclosure and consultation with the local population affected by the project.
- *Health and Safety Plan* is either one plan covering both the project construction and operation phases or two separate plans, one for each phase, which describes the actions necessary for the project and each environmental party to comply with all applicable environmental and social requirements relating to health and safety. The plan shall include: (i) a description of potential health and safety hazards based upon the specific project works/activities; (ii) a detailed description of necessary procedures and equipment which are technically appropriate to deal with such project specific health and safety issues; (iii) a clear and complete description of all major responsibilities and authorities relating to the implementation of the plan; (iv) a description of the specific project supervision methods (including audits, documentation and record-keeping, on-site monitoring, and medical surveillance) to be implemented to ensure that the plan is completely and properly implemented by each environmental party; (v) a description of the specific health and safety training that will be provided to persons involved with the project and the minimum levels of training required; (vi) a description of emergency response procedures; and (vii) an estimated cost, time schedule and assigned responsibility for implementing each component of the plan.
- *Contingency Plan* is either one plan covering both the project construction and operation phases or two separate plans, one for each phase, to properly prevent and control unplanned but foreseeable events associated with the project or any environmental party, including the release of hazardous substances, that could reasonably be expected to lead to violations of environmental and social

Requirements, environmental claims or adverse impacts with respect to environmental and social matters. The plan shall: (i) comply with all requirements in the Environmental Impact Assessment and in any applicable authorization; (ii) include a description of the potential project risks, hazards and emergencies and the measures, procedures, equipment, training, responsibilities, schedules and resources (including monetary and manpower resources) required to adequately prevent, control, respond to, and remedy such potential project risks, hazards and emergencies; (iii) include a statement of the estimated cost, time schedule and assignment of responsibility for implementing each component of the plan; and (iv) include a description of the reporting procedures to be implemented upon the occurrence of any such event.

- *Spill Prevention and Counter-Control Plan* or *SPCC* is either one plan covering both the project construction and operation phases or two separate plans, one for each phase, to properly prevent and control the release of hazardous substances. The plan shall include a description of: (i) the potential types of releases and the likely pathways or movements; (ii) the measures, procedures and equipment required to prevent and control likely accidental releases; (iii) the measures, procedures, and equipment required to adequately respond to, control, and remedy any spills or accidental releases; (iv) the staff and organizational responsibilities, including training and local services; and (v) the reporting procedures to be implemented upon the occurrence of a release.

8.7 Other standard environmental and social provisions require that the project company shall during the life of the IDB loan agreement (see Section 8.2.1 for additional Camisea Project-specific technical requirements):

(i) Comply with all applicable Peruvian environmental, health and safety regulatory requirements, in particular: (a) all the conditions established in the environmental permits; (b all environmental, health and safety requirements of the project contracts, and any subsequent modifications; and (c) all requirements associated with any environmental, health and safety related permits, authorizations, or licenses that apply to the relevant project company.

(ii) Ensure that all companies contracted for construction or operation activities comply with the applicable environmental and social requirements of the legal agreement.

(iii) Implement an environmental, health and safety management system that is consistent with the main principles of ISO 14001 and BS 8800 (for environment and health and safety, respectively), for the construction and the operational phases.

(iv) Submit an environmental and social compliance report, in form, content and frequency as determined by the IDB.

(v) Consult with the IDB before approving or implementing any and all material changes, as determined by the IDB, to the project or its timetable that could potentially have negative environmental, social, or health and safety effects.

(vi) Send written notice of any and all material noncompliance with any environmental and social requirement of the loan agreement and any significant environmental, social, or health and safety accident, impact, event or environmental claim.

(vii) Implement ongoing information disclosure and consultation activities related to environmental, social, and health and safety aspects of the project.

8.8 In addition, there are standard environmental and social financial-related requirements in the Loan Agreement in order to help ensure compliance with the environmental and social provisions and are listed below.

(i) Conditions required for the signature of the Loan Agreement (i.e., Financial Closure), which include those conditions necessary to fully demonstrate to the satisfaction of the IDB the environmental and social viability of the project (see Section 8.2.2 for Camisea Project specific requirements).

(ii) Conditions for the first and subsequent disbursements. For first disbursement this includes the submittal of final Environmental and Social Plans (i.e., Environmental and Social Management Plan, Health and Safety Plan, Contingency Plan and Spill Prevention and Counter-Control Plan) for the construction phase in form and substance acceptable to the IDB. For all disbursements, this includes compliance with the environmental and social provisions in the applicable Loan Agreement. See Section 8.2.3 for Camisea Project specific requirements.

(iii) Conditions prior to initiation of operations, which includes the receipt by IDB, in form and substance acceptable to the IDB, of the operation phase Environmental and Social Plans.

(iv) Conditions for Technical Completion and Project Completion[27], which include compliance with the environmental and social provisions in the applicable Loan Agreement (see Section 8.2.4 for Camisea Project specific requirements).

8.2 Camisea Project-Specific Environmental and Social Provisions

8.9 As part of the IDB environmental and social due-diligence of the Camisea Project, the IDB has identified various environmental, social and health and safety requirements in order for the proposed financing of the Downstream Component by the IDB to be acceptable. These requirements include those requirements in Section 8.1 and additional requirements as described in this sub-section. Some of these requirements are the responsibility of the Project Companies while others are the responsibilities of the GOP. The IDB is proposing to provide financing only to the Downstream Component and thus will have specific contractual agreements (i.e., loan agreement) with TGP. Should the U.S. Export Import Bank (ExIm) provide financing for the Upstream Component, ExIm would enter into a contractual agreement with Pluspetrol. The applicable environmental and social provisions for the Downstream component will be set forth in the loan agreement between the IDB and TGP. IDB and ExIm staff has discussed the environmental and social aspects and risks of both the Upstream and Downstream Components and their potential environmental and social

[27] Technical Completion and Project Completion are milestones to be achieved by a project company in ore to release certain sponor guarantees as part of project financing. Technical Completion is an intermediary step which relates mainly to the proper construction of the project in accordance with the contractual requirements. Project Completion includes the requirement for Technical Completion and the requirement to comply with a set of financial conditions (e.g., performance ratios, etc.). Sponsor guarantee (support) consist of the company (sponsor) being fully liable for the repayment of the loan obligations, which requires the sponsor to fully report such obligations in their financial statements and/or bear the financial cost associated with the liquid instruments backing up such obligations. Technical Completion date typically occurs from 6 months to 1 year after construction and Project Completion typically varies from almost immediately to 2 years after Technical Completion.

requirements. ExIm staff has indicated that should ExIm decide to finance the Upstream Component, ExIm would set forth formal environmental and social conditions in the legal agreement between ExIm and Pluspetrol. If all the requirements desired by IDB are not included in the legal agreement between ExIm and Pluspetrol, the IDB would require a letter/side agreement between the IDB and Pluspetrol. In addition, the IDB is working with the GOP to develop a Letter of Commitment prior to financial closure in which the GOP would formalize its commitments to address the environmental, social and health and safety aspects associated with the Camisea Project.

8.10 In this context, presented below is a summary of the project-specific environmental and social requirements proposed for the Downstream and Upstream Components and those concerning the GOP, which are in addition to the environmental and social requirements mentioned in Section 8.1, specifically:

- Specific technical environmental and social requirements for the Downstream and Upstream Components (Section 8.2.1);
- IDB conditions for signature of the legal agreement with TGP for the Downstream Component (Section 8.2.2);
- Specific requirements for loan disbursements (see Section 8.2.3);
- Specific requirements for Technical Completion and Project Completion (see Section 8.2.4); and
- Specific financial mechanisms to ensure environmental, social and health and safety impacts are properly mitigated and to promote compliance with the environmental and social requirements (see Section 8.2.5); and
- Proposed content of the Letter of Commitment in which the GOP would formalize its commitments to deal with environmental and social aspects with the Camisea Project (see Section 8.2.6).

8.2.1 Technical Provisions for Downstream and Upstream Components

8.11 Specific environmental and social provisions for the legal agreement for the Downstream and Upstream Component would include, in addition to those listed in section 8.1, compliance with each of the items listed below for the life of the legal agreement.

(i) Environmental standards as defined under (a) Peruvian legal requirements, (b) presented in this ESIR (e.g., see Section 3), and (c) the General Environmental Guidelines and Onshore Oil and Gas Guidelines (World Bank Pollution Prevention and Abatement Handbook, 1998).

(ii) If there are any subsequent expansion or new works (e.g., pipeline looping, etc.) that may have potentially significant impacts or risks relating to environmental and social matters, the Project Component company shall: (a) develop and fully implement an Environmental Impact Assessment in form and substance satisfactory to IDB; (b) make such EIA available to the local affected population and to IDB, well in advance of the start of commencement of any construction activity; (c) perform appropriate and sufficient public consultation activities prior to construction commencing, and during construction and operation; and (d) develop and implement a specific Environmental and Social Management Plan, Health and Safety Plan, Contingency Plan and Spill Prevention and Counter-Control Plan with respect to such expansion or work.

(iii) Supervision actions related to environmental, social and health and safety (see pargraph 8.16, items (i) to (iv)).

8.2.2 Conditions for Financial Closure

8.12 As a condition for signing of the loan documents (i.e., Financial Closure) for the Downstream Component, the IDB must receive, in form and substance acceptable to the IDB, the following:

(i) A final Revegetation Plan to ensure adequate revegetation after construction, including the use of appropriate native species and avoiding exotic and invasive species;
(ii) A final Access Control Plan to prevent the use or access of the pipeline right-of-way, including specific actions to be implemented and the responsible entity, coordination among entities involved, and resources required;
(iii) Confirmation from the IDB external independent consultant and Knight-Piésol that soil erosion is being adequately mitigated;
(iv) Establishment of specific environmental, social and health and safety benchmarks (e.g., milestones for completion of certain activities, levels of environmental performance) for construction and operation of the Camisea Project;
(v) Evidence of significant progress in the implementation of the IDB public sector loan 1441/OC-PE with the GOP on Institutional Strengthening, including in particular reasonable actions taken by the GOP on improving the legal protection status of the Nahua-Kugapakori reserve; and
(vi) Decision on level of GOP, TGP and Pluspetrol participation on their financial participation in proposed Camisea Fund to assist in local economic, environmental and social development in areas of influence of the Camisea Project.

8.13 In addition, as a condition for signing of the loan documents for the Downstream Component, the IDB must receive, in form and substance acceptable to the IDB, the following in relation to the fractionation plant and marine terminal proposed for Playa Lobería:

(i) GOP approval of the EIA for the Marine Terminal;
(ii) Public disclosure of all complementary studies/assessments (i.e., subsequent to EIA) that have been done to fully identify the project environmental and social impacts from all components (e.g., underwater pipeline, ship traffic, etc.);
(iii) Description of all necessary mitigation and monitoring measures in order that construction and operational project-related (on land, underwater pipeline, ship traffic, etc.) environmental and social impacts and risks will be adequately mitigated, including specifically the construction phase Environmental and Social Management Plan and Contingency Plan, water quality monitoring program for dredging and pipeline installation, including acceptable criteria and standards, risk assessment including all spill modeling, and principles and framework for operation phase Contingency Plan and Spill Prevention Counter-Control Plan including acceptable criteria and standards (in addition to IDB requirement established here in item (iii) that has to be acceptable to the IDB, as mentioned in section 8.1, the IDB has proposed that the Upstream Component agreement requires all construction-phase plans to be in form and substance acceptable to the applicable lenders prior to first disbursement and

compliance with such plans is an environmental and social requirement in the agreement); and

(iv) Action plan to develop and implement a strategic regional development and management plan which will address potential induced impacts of fractionation facility, other sources of wastewater effluent or pollution to the Paracas Bay, and adequate funding of the Paracas National Park management plan.

8.2.3 Conditions for Disbursements

8.14 As a condition for the first disbursement for the Downstream Component, the IDB must receive, in form and substance acceptable to the IDB, the following:

(i) Biodiversity monitoring program for the Downstream Component; and

(ii) Evidence of adequate resources (e.g., budget and staff) for management of environmental, social and health and safety aspects during project construction and operation.

8.15 As a condition for all disbursements (including the first) for the Downstream Component, the Downstream Component must be in compliance, to satisfaction of the IDB, with the environmental and social provisions in the Loan Agreement and this compliance must be certified by the external independent environmental and social consultant.

8.2.4 Technical Completion and Project Completion

8.16 As a condition for both Technical and Project Completion of the Downstream Component, the Downstream Component must be in compliance, to the satisfaction of the IDB, with the environmental and social provisions in the Loan Agreement and must be certified by the external independent environmental and social consultant. . As part of technical and project completion for Downstream Component, successful mitigation of the related impacts/risks associated with re-vegetation and access control of the ROW will be specifically assessed. If the results are not acceptable, as determined by the IDB, sponsor support will not be released and/or an appropriate additional financial mechanism (e.g., environmental reserve account or performance bond) will be established.

8.2.5 Financial Mechanisms

8.17 Various financial mechanisms, in addition to those already mentioned for disbursements (Section 8.2.3) and Technical and Project Completion (Section 8.2.4) to be used in the appropriate agreements to ensure environmental, social and health and safety impacts are properly mitigated and to promote compliance with the environmental and social requirements are summarized below.

(i) TGP to maintain adequate insurance to cover all reasonable potential environmental, social and health and safety issues during both construction (at a minimum of $50 million; general and third party liability, workers compensation) and operation (consistent with industry best practices/standards), including coverage in respect of gas releases or liquid spills during operation

(ii) Pluspetrol to maintain adequate insurance to cover all reasonable potential environmental, social, and health and safety risks during both construction (at a minimum of $25 million; general and third party liability, workers compensation,

environmental pollution for marine terminal) and operation (consistent with industry best practices/standards), including coverage in respect of (a) well and flowline spills or releases; (b) unplanned releases, discharges, fires or explosions at processing plant; and (c) unplanned releases, discharges, fires or explosions at fractionation plant including loading operations and river transport activities.

(iii) Failure by a project company to comply with the established environmental and social provisions will result in the lender's right to block payment of dividends to shareholders, require a corrective action plan to resolve the non-compliance, and in the case of ongoing non-compliance the right to accelerate loan repayment.

(iv) As appropriate, based upon the timing of financial closure and environmental and social conditions, additional financial mechanisms will be established to ensure full and adequate implementation and compliance with all environmental, social and health and safety requirements (including plans, procedures, etc.). In particular, this could relate to (a) revegetation and erosion and sedimentation control of the Downstream Component, (b) final closure of well fields for the Upstream Component, or (c) adequate resources (budget and staff) for operation phase environmental, social and health and safety maintenance for Downstream and Upstream Components.

8.2.6 GOP Letter of Committment

8.18 IDB is working with the GOP for a Letter of Commitment by the GOP in which they would formalize the GOP's commitments to deal with direct, indirect and cumulative environmental and social impacts and risks associated with the Camisea Project. Proposed components within this Letter of Commitment include the following:

(i) Perform its obligations under Peruvian law in order to preserve the environmental and social sustainability of the areas of influence of the Camisea Project;

(ii) Fully and effectively complete all components in the IDB public sector loan 1441/OC-PE with the GOP on Institutional Strengthening;

(iii) Participate in the development and implementation of a Camisea Fund, financed by GOP royalties and company participation, to assist in local economic, environmental and social development in areas of the project influence;

(iv) Improve the legal protection status of the Nahua-Kugapakori reserve, in consideration and adherence to participation requirements in ILO 169, including issuing a degree related to temporarily improve the protection status that would prohibit any new extractive activities (beyond what is contemplated for the Camisea Project) within the reserve until a permanent improvement in the protection status can be completed;

(v) Ensure a through and complete review of the proposed fractionation plant and marine terminal, including as appropriate civil society input;

(vi) Actively participate and promote a system for ongoing strategic environmental planning for the Lower Urubamba area in order ensure the environmental and social sustainability of the area, especially in relation to any future projects, and such planning to be multi-discliplinary, multi-stakeholder, in coordination with local and regional authorities;

(vii) Actively participate and promote a multiple-stakeholder system, in coordination with local and regional authorities, for ongoing strategic regional development and management for the Paracas Bay in order to ensure the environmental sustainability of the Paracas Bay and Paracas National Park, including addressing land use classification (zoning) of areas to prevent any future development that is not fully

compatible with protection of Paracas Bay and Paracas National Park, resolving the problem of fish meal companies and other sources of wastewater effluent to the Paracas Bay, and adequate funding of the Paracas National Park management plan

(viii) Implement technical assistance to those governmental entities that will be receiving (or have access to) money from project royalties, canons, taxes, etc. related to revenue management, transparent and participatory regional planning processes, local government support to protected areas, and the adoption of sustainable development principles into the design and implementation of infrastructure projects;

(ix) Provide the necessary and sufficient resources over the life of the Camisea Project for the complete implementation of the management plans for Otishi National Park, Communal Reserves of Ashaninka and Machiguenga, Megatoni Santuario (once created), enhanced protected area to be established related to Nahua-Kugapakori Reserve, and Paracas National Reserve;

(x) Ensure the routine GOP supervision/monitoring activities and results of the Camisea Project are made available to the public, such as via the GTCI or Camisea Project websites, in accordance with applicable confidential information regulations;

(xi) Improve the provision of GOP health services and health monitoring in the lower Urubamba, including development and implementation of an epidemiological action plan;

(xii) Create a civil society consultative mechanism within the GTCI in order to improve coordination and dialogue between Peruvian civil society and the GOP;

(xiii) Ensure OSINERG will continue full-time supervision of the Camisea Project during construction including in the Nahua-Kugapakori reserve and subsequently, at an adequate level, during operation; and

(xiv) Implement institutional arrangements for an effective Ombudsman function;

(xv) Provide information to the public on the status and results of actions taken related to this Letter of Commitment;

(xvi) Consider requesting additional financial or other assistance from the IDB if additional resources are necessary related to fulfilling this Letter of Commitment.

8.3 Camisea Project Supervision

8.19 In addition to the supervision activities on the Camisea Project summarized in Section 6.4, the IDB plan for supervising the environmental, social and health and safety aspects of the Camisea Project (all components) also includes:

(i) TGP and Pluspetrol will continue to make available to the public environmental and social compliance reports, at a minimum of once per month, until completion of construction and quarterly during operation;

(ii) TGP, Pluspetrol and Tractebel will enhance their existing programs of consultation with Peruvian civil society, including (a) implementing a system to routinely synthesize and report supervision/monitoring results to affected population and local NGOs; and (b) having an annual environmental and social audit performed by an objective independent group during the operation phase of the Camisea Project and making the results of such audit available to the public;

(iii) TGP and Pluspetrol will continue to provide, as required, the necessary resources for the Community Monitoring Program.

(iv) TGP, Pluspetrol and Tractebel will continue to formally coordinate in relation to environmental, social and health and safety aspects.

(v) The IDB will use an external independent environmental and social consultant to assist in supervising the environmental, social, and health and safety aspects of all three components of the Camisea Project. The independent consultant will provide staff in the field full-time until at least the end of construction. Subsequently, the independent consultant will perform quarterly site visits and reviews during the first two years after construction and annually thereafter for the life of the IDB loan agreement. The consultant will be managed by the IDB, and report solely to the IDB, using funds provided by TGP. Reports from the independent consultant will be made available to the public.

(vi) The IDB will contract an independent senior advisor for the Camisea Project, until at least after the completion of construction, paid directly by the IDB, above and beyond the independent external environmental and social consultant.

(vii) The IDB will also perform direct supervision actions (e.g., site visits, review of documentation, etc.) and will take necessary measures to ensure adequate resources are available.

(viii) The IDB will have the right, as part of the legal agreement, to have an independent environmental, health, and safety audit performed, if warranted.

(ix) The IDB will coordinate with other lenders of the Camisea Project with respect to supervision of the Camisea Project.