2003 Environmental Statement

BP Vietnam - Nam Con Son Pipelines

Foreword

This Environmental Statement covers the Nam Con Son Pipelines (NCSP) Performance Unit, BP Vietnam. The purpose is to report our environmental performance to our partners, contractors, stakeholders and the public for the period of January-December 2003. We see the management of our environmental performance as integral to the way we do business.

In accordance with our HSE Policy, we are committed to continual improvement in environmental performance and achievement of our goal, 'no damage to the environment.' To meet our commitments we have set ourselves targets to prevent and reduce pollution from our discharges, emissions, and waste.

In 2003 we were successful in achieving our targets set for the year.

In 2004 our objectives remain to reduce our atmospheric emissions, wastes generated, and meet all environmental requirements of local authorities. We will continue to identify and implement options that reduce the impact of our operations under changing operating conditions.

Canh, Do

Director of Nam Con Son Pipelines

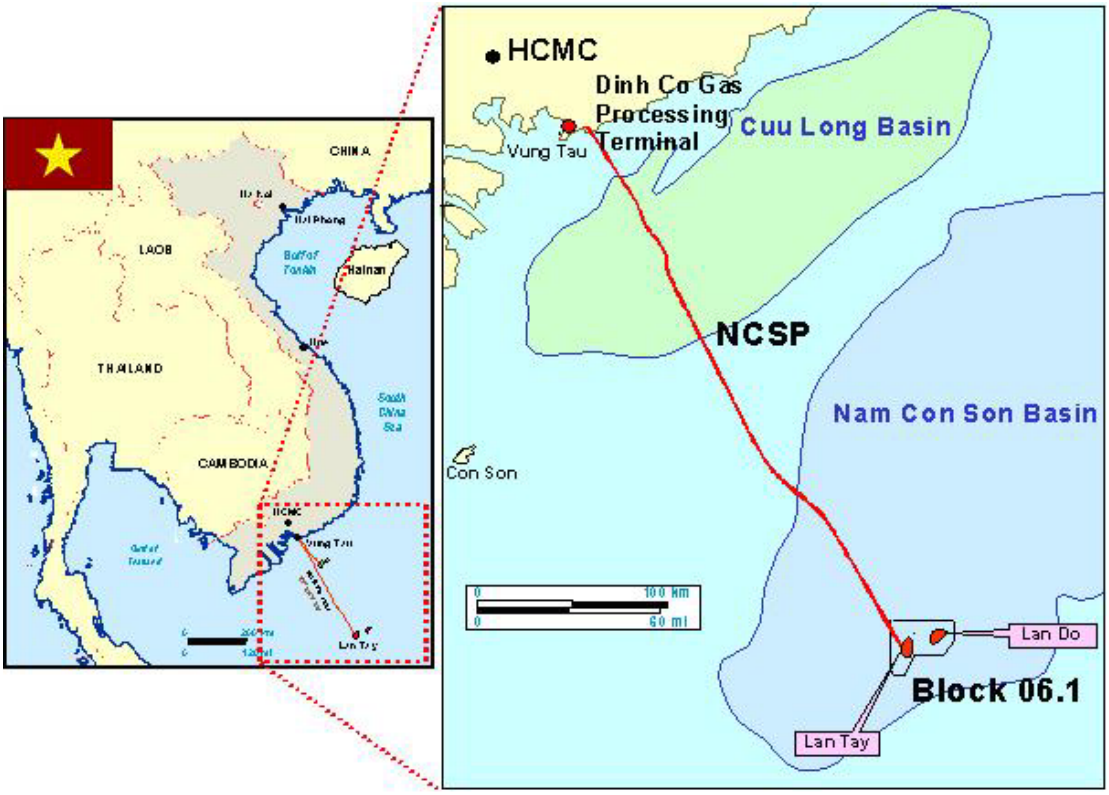
1 Introduction

BP has a global policy of *no accidents, no harm to people, and no damage to the environment.* In Vietnam, we rigorously apply this policy to all our assets and operations and this report aims to present our performance against our goal of ***no damage to the environment***.

This Report focuses on the Nam Con Son Gas Project (NCSGP), BP's principle upstream asset in Vietnam, and in particular, on the operation of **Nam Con Son Pipelines (NCSP)**. The NCSP incorporates a 371 km-long pipeline which transports gas and condensate from the Lan Tay gas production platform in Block 6.1, 370km offshore south eastern Vietnam, to an onshore gas processing terminal and a 28 km-long onshore pipeline to customers. A separate report has been prepared covering the offshore extraction of gas in the Lan Tay/Lan Do gas field.

This report presents our environmental performance for the period January – December 2003. This represents our first year of commercial operations for the project and for BP's upstream interests in Vietnam.

Figure 1.1: Location of the NCSP



BP Vietnam Environment Policy

BP Exploration Vietnam

Health, Safety and Environment Policy Statement

BP Exploration Vietnam Business Unit is committed to continuous improvement in health, safety and environmental performance, consistent with our goals of:

no accidents, no harm to people, and no damage to the environment.

We apply the following principles:

- all accidents are preventable
- no activity is so important that it cannot be done safely
- we prevent pollution and reduce the environmental impact of our activities
- we meet or exceed the requirements of applicable HSE legislation, regulations and BP HSE expectations
- HSE performance depends on everyone in our BU; we are all responsible for working safely.

We strive to reduce continuously the impact of our business on health and the environment by reducing waste, emissions and discharges, and by using energy efficiently. We will eliminate injuries by rectifying and reporting all actions and conditions, which could lead to an incident.

Responsibilities for HSE performance are visible throughout the organisation, with clarity on line management accountability. BP's Management System Framework of Getting HSE Right with a set of Golden Safety Rules, Integrity Management Standards and Environmental Expectations are fundamental to our business, and through our operations in exploration, development, extraction and transporting of gas we fully support its goals and requirements.

Our business plans and personal objectives include measurable HSE targets, which are established annually and reviewed regularly.

The Business Unit Leader is accountable for implementation of this policy. We achieve this through the BU management systems, and where appropriate the management systems used by those who work with us.

Mary Shafer-Malicki
Director General (Vietnam)

25 October 2004

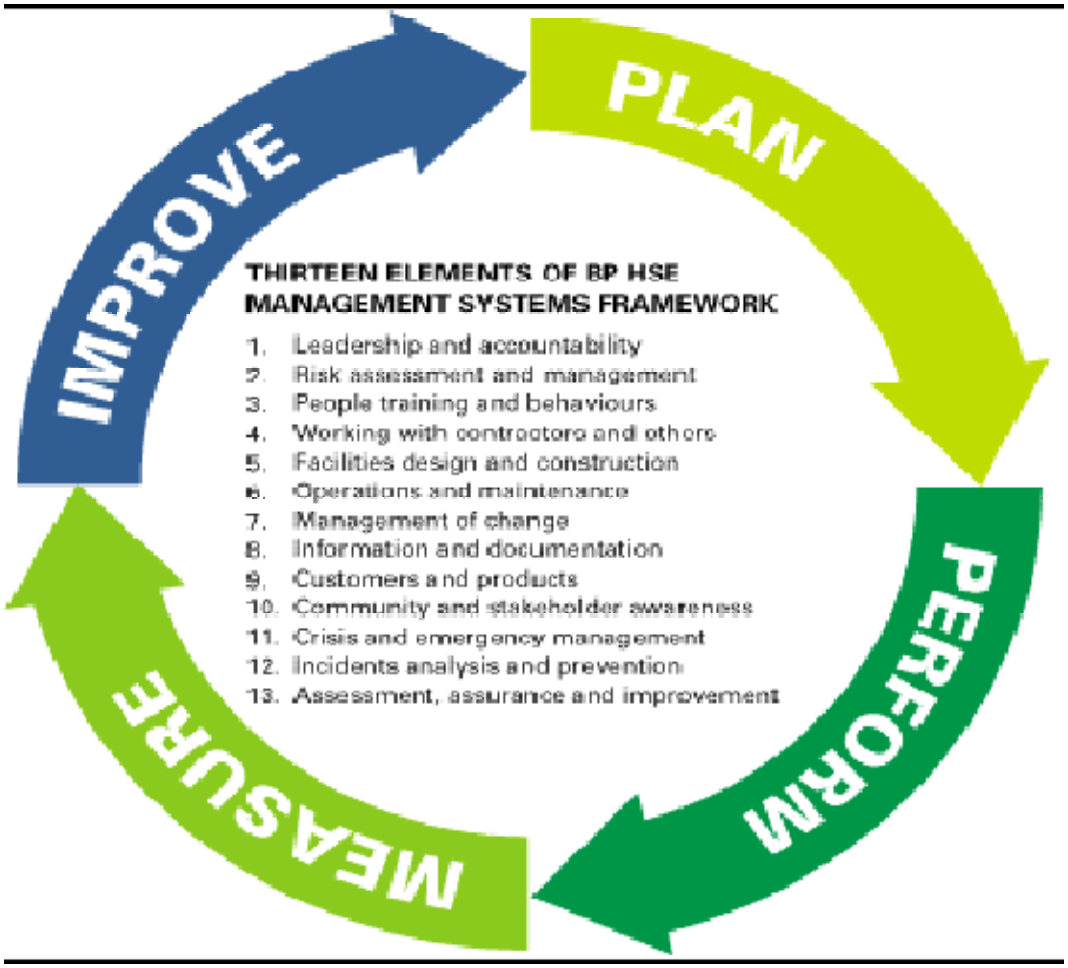
BP Exploration Vietnam Business Unit (BP Vietnam) implements its own environmental policy which is aligned to the policy of BP Group. BP Vietnam is committed to continual improvement in environmental performance, consistent with its overall goals of *no accidents, no harm to people, and no damage to the environment***.**

In order to achieve these goals, every employee and contractor working for, or on behalf of the NCSGP is given responsibilities for ensuring that our operations and activities are undertaken so as to:

- Prevent pollution and reduce environmental impacts;
- Meet or exceed the requirements of applicable environmental legislation, regulations and BP environmental expectations, and
- Continually improve our environmental performance by reducing waste, emissions and discharges, and by using energy efficiently.

In Vietnam, we also strictly support and apply BP's group guideline on managing health, safety and environment (HSE) called "*getting HSE right*" (GHSER). The guideline sets out our Group policy expectations including compliance with legal requirements and full commitment by all employees and contractors to an HSE improvement process etc. These expectations are detailed within the thirteen elements of the HSE Management System Framework, illustrated here in *Figure 1.2* below.

Figure 1.2 HSE Management System Framework



In order to comply with this policy, achieve our aspired goals, and meet the requirements of GHSER, we fully recognise the need to manage our environmental impacts effectively and systematically. We actively seek to identify, acknowledge, and address the impacts that our operations generate and to determine and understand how these affect the environment. Throughout our activities in Vietnam - since exploration activities first began in 1992 through to the present day - we have therefore actively invested in managing our identified environmental impacts, in terms of both technical and financial measures.

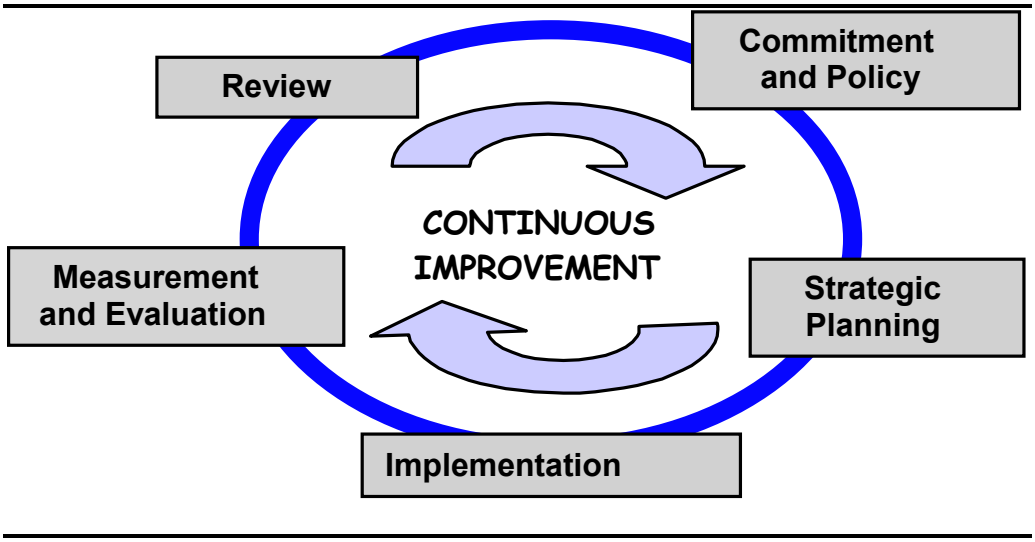
To do this, we have developed and implemented an environmental management system which provides for:

- Implementation of operational control procedures, permit to work procedures, abatement techniques, on-line monitoring, and maintenance management systems etc.
- Dedicated investigations of impact including assessments, performance monitoring, measurement, research activities, stakeholder dialogues, and community liaison, etc.

- Establishment of objectives and targets to drive environmental performance improvements; and
- Regular and focused training for all staff on environmental management responsibilities.

Our approach to environmental management is illustrated in *Figure 1.3* below.

Figure 1.3: Our Environmental Management Policy cycle



In recognition of our environmental management commitment, we undertook to achieve ISO 14001 certification of our environmental management system. Within just 11 months of commercial operations starting, NCSP achieved ISO 14001 certification, dated 27th November 2003. Within the context of Vietnam this stands out as a remarkable achievement.

Our commitment to, and our performance in achieving exemplary environmental standards was also recognised in October 2003, when BP Vietnam was awarded the 10-year environmental achievement merit certificate by the Department of Natural Resources and Environment (DoNRE) of Ba Ria Vung Tau Province in whose jurisdiction, the NCSGP is located. We have since applied for and hope to achieve recognition at a national level for our accomplishments in environmental protection.

2 Our operations

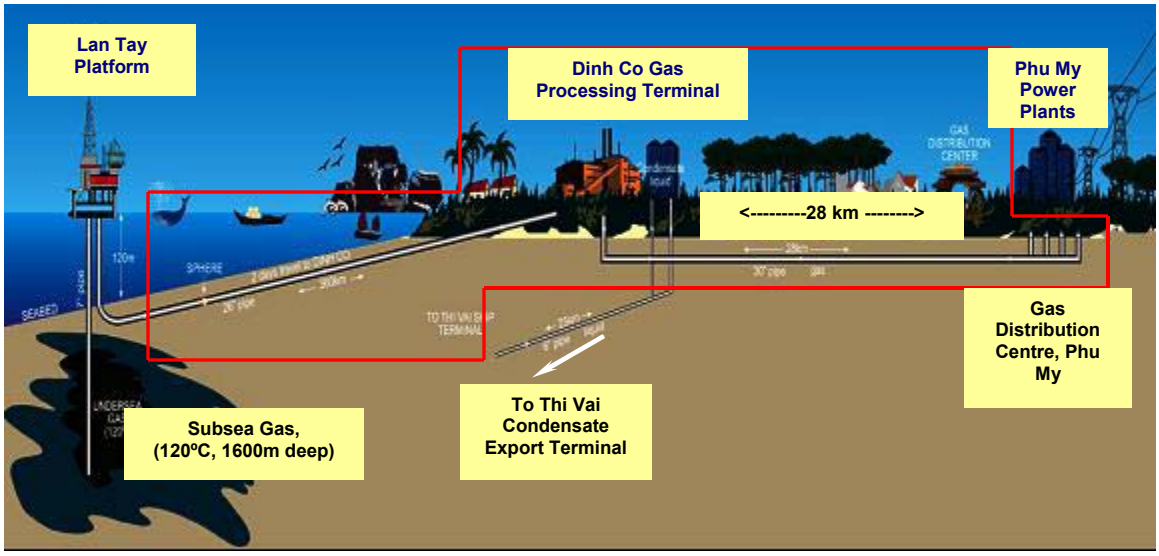
The US$1.3-billion NCSGP is currently the largest foreign-invested project to date in Vietnam. The Project incorporates:

1. **Development of Block 6.1:** comprising the Lan Tay and Lan Do non-associated gas fields some 365km offshore of the southern Vietnamese coast) including drilling of production wells, subsea flow lines connected to the Lan Tay production platform; and

2. **The Nam Con Son Pipelines (NCSP):** transfer of gas onshore (via a 362km high pressure offshore pipeline and a 9km onshore pipeline) to the Dinh Co Gas Processing Terminal in Ba Ria Vung Tau Province, followed by onward transfer (via a 28km high pressure pipeline) to the gas distribution facilities at Phu My power complex.

This Environment Statement refers specifically to the **NCSP** as marked within the red border in *Figure 2.1* below.

Figure 2.1: Schematic of the Nam Con Son Gas Project *(red box surrounds the components of the NCSP)*



Project Overview

The NCSGP marks a milestone in the development of Vietnam's natural gas sector. With gas output expected to eventually reach 20 million cubic meters/day (approximately 6 billion cubic meters/year), the project will deliver enough fuel to produce 12 billion kWh of electricity. Based on 2002 figures, this was enough to

meet 40% of Vietnam's electricity demand. The project is therefore making a significant contribution to national economic development in Vietnam.

The NCSP is a key element in this master project enabling the resources of the Lan Tay and Lan Do gas / condensate fields to be distributed to customers onshore. In doing so, NCSP also carries wider regional significance in that it is providing strategic infrastructure to enable the development of other Nam Con Son basin gas resources, specifically in Blocks 11-2, 5-2 and 5-3. Furthermore, as a global indicator, the NCSP is the world's longest mix two-phase gas pipeline.

BP owns a 32.67% share in NCSP with other investors being Petro Vietnam (51%), and ConocoPhillips of the US (16.33%).

Onshore and offshore development of the NCSGP began in October 2001 and first gas was achieved in November 2002. The project has been in commercial operation since January, 2003.

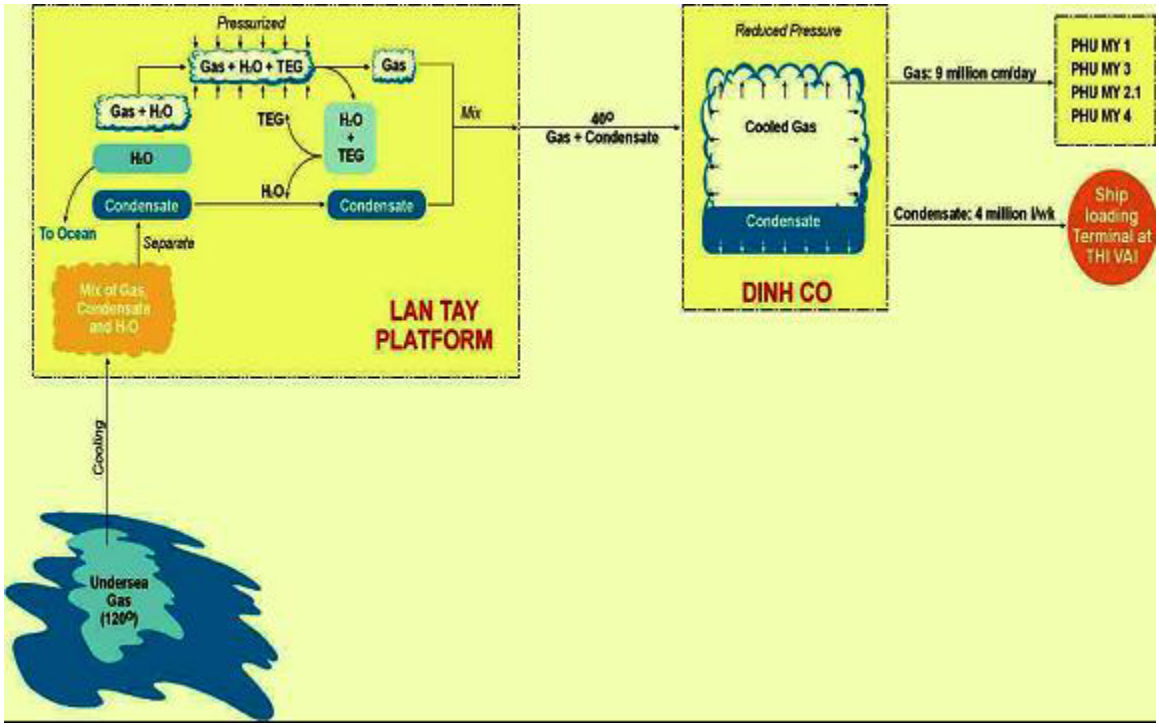
Overview of NCSP Operations

The NCSP project transports and treats natural gas and hydrocarbon condensate from the Lan Tay gas field (Block 6.1) located some 370km offshore ready for commercial sale. The Lan Tay platform receives exploited subsea gas which contains condensate, water and gas. On Lan Tay, a primary separation process removes the water and the remaining condensate and water-free gas are piped along the 371km-long offshore pipeline to the Dinh Co Gas Processing Terminal. The gas currently takes 1 day to reach the terminal.

At Dinh Co, the gas-condensate mixture is separated and the gas further cooled by pressure reduction, resulting in additional condensate to be separated. All condensate is stabilised by heating, which results in low pressure gases that have to be compressed and added to gas stream. Without this compression, much more gas would need to be flared. The separate streams are then ready for sale. Currently, 9 million m^3/day of gas is piped via a 28km long pipeline to the Phu My Power Plant Complex. Meanwhile, some 4 million litres per week of liquid condensate is transported via a 25km pipeline to ship loading facilities at Phuoc Hoa on the Thi Vai River for export to customers. This condensate pipeline and ship export terminal are owned and operated by Petro Vietnam Gas Company.

The gas-condensate separation process at Lan Tay and Dinh Co terminal is illustrated in *Figure 2.2* below.

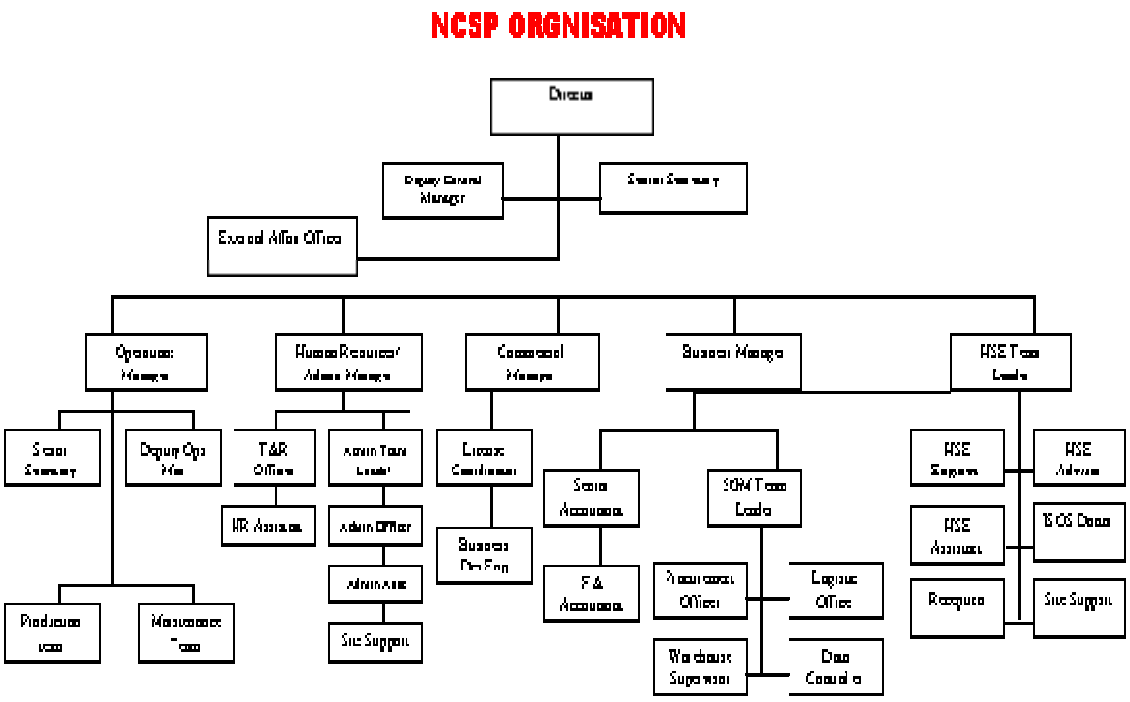
Figure 2.2: Simplified Production process of the NCSGP



Staff and Organisation of NSCP

NCSP employs some 102 staff at the Dinh Co Terminal and at its Ho Chi Minh City office and approximately 85% are Vietnamese. The organisational structure of NCSP is presented in *Figure 2.3*.

Figure 2.3: Organisational Structure of NCSP



People at all levels in BP Vietnam are responsible for working towards our achievement of our HSE goals and objectives and demonstrating correct HSE behaviour. Leaders in particular are held accountable for achieving environmental objectives. They must clearly define HSE roles and responsibilities of their staff, provide the resources necessary to accomplish our goals and are responsible for measuring, reviewing, and continually improving our HSE performance.

III. Methodology of impact identification, determination and management

In order to effectively manage, reduce and minimise the negative environmental impacts we may have on the environment and to meet our commitment of *no damage to the environment*, NCSP implements a comprehensive environmental management system (EMS). The system was certified as meeting ISO 14001 standards in November 2003.

The first stage in our management system approach is to understand what NCSP activities could interact with the environment. These are known as environmental ***aspects.*** Our environmental *aspects* take account of activities during:

- Normal operations (routine events);
- Abnormal operations (non-routine but planned events such as start-ups, shut downs and maintenance); and
- Emergency events (unplanned, uncontrolled events e.g. fire or explosion).

We systematically list our activities that have the potential to interact with the environment (e.g. power generation) and then identify what inputs go into this activity (e.g. fuel) and what is the output (e.g. emissions to air).

We then consider what ***impact*** these interactions could have on the environment. An environmental impact is defined as any change to the environment, whether adverse or beneficial, wholly or partially resulting from NCSP's activities. We recognise that out activities could lead to both *direct* and *indirect* impacts. For example, a direct impact of us discharging waste water is river pollution; its indirect impact is changing the ecology of the river ecosystem. We identify our impacts with respect to:

- Discharges to sea / river
- Emissions to the atmosphere
- Energy
- Waste Management
- Noise, odour and other nuisance factors;
- Use of raw materials and natural resources;
- Environmental performance of suppliers and contractors; and

- Other local environmental issues.

We then evaluate the ***significance*** or importance of our identified impacts. This helps us determine how we should manage the impact. We assess the significance of our environmental impacts by considering whether:

- The impact is controlled by legislation;
- It can be addressed by Group / company policy;
- It is of concern to stakeholders (i.e. local authorities, communities, etc.).
- The environmental impact (emissions, nuisance, ecosystem damage, resource use, etc.) is short or long term.

This process of identifying and assessing our aspects and impacts is the basis of our environmental management policy and is an ongoing activity. It enables us to effectively manage the past, present and future impacts of our activities.

Recording our Environmental Aspects and Impacts

All our environmental aspects and impacts are recorded in an Environmental Effects Register. A simplified extract of our current Environmental Effects Register is presented in ***Annex 1***. The Register is a living document and remains under review throughout the lifetime of NCSP operations.

Managing NCSP's Environmental Impacts

For each significant impact we have identified, we determine the most effective approach to prevent, reduce and manage the impact. Our impact management process includes:

- **Operational controls**, such as operational procedures, control technologies to minimise discharges, continual monitoring programmes, maintenance procedures etc. We also implement a "Safety Training Observation Programme" (STOP) system which aims to control and stop potentially damaging or unsafe actions
- **Specific objective and quantifiable targets** that are established annually and reviewed regularly to ensure that we are targeting continual improvement in our impact management process. These objectives and targets – and our performance against these are described further in the next section of this report; and
- **Investigation or research** of planned activities to enable us to better understand potential impacts and how best to manage them. These activities may include external or internal assessment, dedicated monitoring or sampling programmes, and stakeholder dialogues, etc.

IV- Impacts and Performance

We have identified the following environmental impacts as being of greatest significance to NCSP's activities during 2003, our first year of operations:

- Contribution to global warming as a result of our consumption of energy and our generation of CO_2;
- Local air pollution resulting from our stack and flare emissions; and
- Depletion of the ozone layer as a result of our use of ozone depleting substances (ODSs);
- Water and groundwater pollution resulting from aqueous discharges.

In addition, NCSP operations also have the potential to lead to:

- A depletion in resources – such as water, hydrocarbons etc.
- Land contamination resulting from accidental spills.

In recognition of these impacts, we have implemented dedicated management and monitoring programmes during 2003 in order to prevent and minimise our impacts. We also established a set of objectives and targets to underline our management commitment and to drive our achievement of best practice environmental performance.

In this section we present our approach to managing these specific impacts, how we have performed against our objectives and targets for the year and how we plan to improve our performance further during 2004 and beyond. A summary is presented in *Table 4.4.*

Issue 1: Green House Gas Emissions

- NCSP consumes natural gas and diesel fuel. Through their combustion at NCSP's Dinh Co Terminal and in our vehicles, we are generating CO_2 and other gases such as methane and carbon monoxide. Any leaks or accidental release of our gas may also result in release of these gases. These so-called 'Greenhouse Gases' (GHGs) are the main contributors to global warming.
- In addition, natural gas and diesel fuel are non-renewable resources. We recognise that we are contributing to the depletion of a natural resource.

Impact

The main sources of GHG emissions at NCSP are from combustion of fuel in power generation and flaring. GHGs emitted from these sources contribute to an increase in global warming.

The likely effects of global warming include a rising sea levels (resulting in flooding of low-lying areas), changing climates (arid areas becoming more arid, wet areas becoming wetter etc) and a higher frequency of extreme weather conditions such as droughts, heat waves, floods, and storms. All could have an impact on the quality of human life, our economic structures and on the natural environment.

Management

BP's global policy is to minimise our operational contribution to global warming as much as possible. This policy is also reflected in the operations of NCSP as described below.

Operational controls

The control of GHG emissions is a key management objective for NCSP. Our management approach incorporates the following:

- Flaring will be minimised and we continually investigate ways to reduce the need for flaring.
- Regular pipeline investigations are carried out to ensure the pipeline systems are in good condition (i.e. no corrosion or mechanical damage) thus minimising the possibility of leaks.
- We carry out regular maintenance of turbine engines to allow more efficient operation.

Objectives/ targets

- During our first year of operation we gave ourselves the objective of understanding our emissions and then setting future improvement targets from this base level.
- NCSP targeted to emit less than 23,300 tonnes (gross) CO_2 equivalent in 2003.
- We also targeted to carry out no high - rate flaring under routine conditions.

Performance

2003 was the first year of operations of NCSP and emissions during the year have been tracked so as to form the baseline for future performance improvements. End of year total emissions of CO_2 / GHGs were 17,000 tonnes (CO_2 equivalent) (BP's equity share was 5,554 tonnes). We therefore operated well within our target for 2003 (23,300 tonnes).

We achieved this target by:

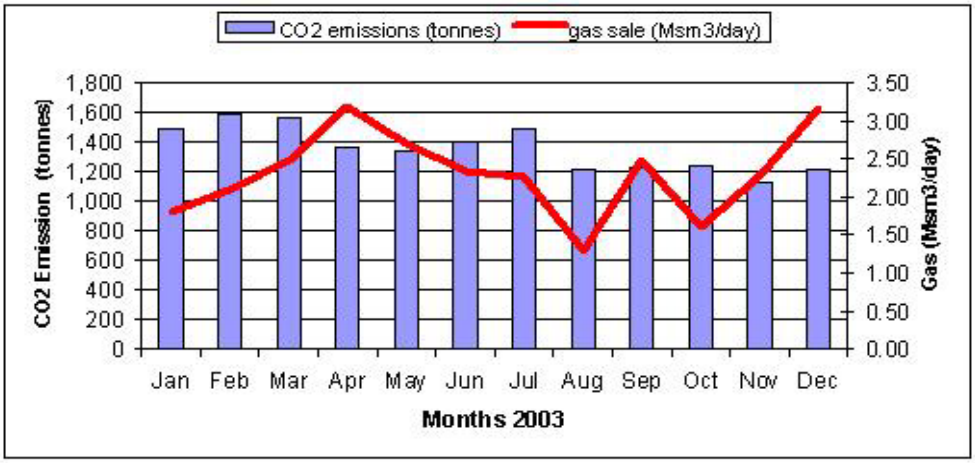
- Successfully identifying and eliminating leaks to the flare system via detailed inspections. At least 3 valves were found to be leaking and were subsequently repaired.

- Effectively managing the operation and maintenance of our compressors on site so as to minimise compressor shutdown time and thereby the need to release flare gas; and

- Strictly following operational procedures and developing effective working plans

In *Figure 4.1*, we show our gas production and the volume of GHG's generated (in CO_2 equivalent). These results are now being used to target and track reductions in CO_2 emissions during 2004 and beyond.

Figure 4.1: Gas production and GHG emissions (in CO_2 equivalent) for NCSP in 2003



Almost two thirds of our CO_2 emissions resulted from fuel use (diesel and fuel gas) for our production process. Our total consumption of fuel in 2003 averaged 17MSm^3 of fuel gas per day, 4.6m3 of diesel fuel per month, and 6Msm^3 of flare gas per day. We have used these figures as a baseline to target fuel consumption reductions in 2004 and beyond. Whilst we will continue to investigate opportunities to improve our efficiency in fuel use, our ability to reduce our CO_2 emissions depends very much on reducing our flaring. We have therefore targeted this for 2004.

We have also quantified our fugitive emissions from our condensate tank by using the guidance of American Petroleum Institute on tank fugitive emissions (e.g. *Tank 4.0 programme)*. Our investigations showed that emissions released due to evaporation are equal to approximately 1 tonne of GHGs (CO_2 equivalent) every month.

Future plans

- For 2004, we have set ourselves the target to reduce our GHG emissions by 9.5% from 2003 levels to a total of 15,400 tonnes.

- To meet this objective, we will continue to focus on reducing flaring through early leak detection. We will implement a "Defects Elimination" programme in 2004 to ensure we have no defects or faults within our process systems that could require maintenance shut downs, a reduction in operating efficiency, and therefore the need to flare.

Issue 2: Other Air Emissions

Through the combustion of natural gas and diesel fuel, NCSP emits NO_x, Carbon Monoxide (CO), Volatile Organic Compounds (VOCs) and small volumes of SO_x and particulates. These contribute to a range of local and regional air pollution problems, which have a harmful effect on human health, ecological systems, and our buildings.

Impact

Operation of power generators, turbines, engines and regular service vehicles are the main

emission sources of air pollutants such as CO, SO_x, NO_x, VOCs and particulates at NCSP. Amongst others things, pollutants such as small particulates can exacerbate respiratory diseases when inhaled, NO_x and VOCs may produce photochemical oxidants including low-level ozone harmful to trees, birds, and humans, and SO_2 may cause acid rain that damages soil, rivers / lakes, vegetation, and buildings.

Management

Given our use of natural gas, which is considered a more environmentally clean fuel, and only small volumes of diesel, our local air pollution impacts are not considered to be critical. Nevertheless, we recognise that we do generate emissions and therefore have developed a variety of management measures to ensure that our emissions are maintained to the minimum necessary and that we achieve year on year improvements.

Operational Controls

We have installed equipment that ensures we meet the Vietnamese emissions standard of 125ppmv dry NO_x and our high efficiency flare was designed reduce hydrocarbon emissions. The use of gas (a cleaner fuel) rather than diesel is maximised (diesel is only used for testing) which also helps us to limit our emissions of SO_x. We implement a comprehensive inspection and maintenance programme to ensure that our combustion systems (turbines, engines etc) are always operating to their highest fuel efficiency.

Furthermore, we implement a monitoring procedure which requires 2 ambient air quality monitoring surveys to be undertaken per year from 2004 onwards. Both surveys will be carried out by an independent organisation.

Objectives/ targets

Our overall objective for 2003 was to meet all relevant legal requirements. With the exception of GHGs, we did not specify targets for other air emissions.

Performance

A baseline ambient air quality survey was carried out in October 2002. A follow up was then carried out as part of an external HSE monitoring survey in June 2003 which confirmed compliance with all air quality parameters measures with the exception of Benzene at one monitoring point. This point lies some 1km north east of our and another producer's Gas Processing Terminals. In response to this, we are planning to take samples of gas from within our turbine generator's stack in 2004.

Future plans

In 2004, we plan to:

- Carry out ambient air quality monitoring around our Gas Processing terminal at least twice. Monitoring will most likely be undertaken by a third party organisation.
- Carry out air an emissions audit programme (by a third party) at least twice, to ensure that we are in compliance with Vietnamese legal standards. The results from these audits will be submitted to our local environmental authority.
- Confirm that our turbines and engines are operating to their design requirements (i.e., that emissions are within Vietnamese standards).
- Monitor the extent of actual fugitive emissions and compare these against industry averages.

Issue 3: Use of Ozone Depleting Substances (ODSs)

Ozone Depleting Substances (ODSs) contribute to the depletion of the stratospheric ozone layer at a regional and global level. The most common uses of ODSs (Chlorofluorocarbons – CFCs and Hydro chlorofluorocarbons - HCFCs) are in air conditioning systems, refrigerators, freezers, fire fighting systems and aerosols.

Impact

The natural ozone layer high in the stratosphere, protects living organisms from the sun's harmful UVA and UVB rays. These rays are the principle cause of skin cancer. When released to the atmosphere, ODSs disperse, degrade and change their composition reacting with ozone and decreasing its concentration. Therefore the use of ODSs indirectly leads to health impacts on humans and ecological systems.

In recognition that some ODSs are more damaging to the ozone layer than others, the Montreal protocol on Ozone Depleting Substances requires signatory governments to gradually phase out certain ODSs. Vietnam has ratified the protocol.

Management

Operational controls

Globally, BP has taken a proactive role in respecting and implementing the provisions of the Montreal Protocol regardless of whether the country within which it is operating has ratified or implemented the provisions of the Montreal protocol. NCSP's policy is therefore not to use any halons or CFCs.

From the start of construction of NCSP through to the present day, we have taken every effort to strictly control the use of ODSs. We have done this by specifying that no refrigerants and fire fighting systems on site or in our operations contain CFCs and halons.

Objectives / targets

NCSP's goal is not to use any halons or CFCs in its operation.

Performance

In 2003, NCSP prepared a comprehensive register of all refrigerants / ODSs used on our site facilities. Our aim was to check that we were meeting our policy of no use of halons or CFCs. Our inspection revealed that no halons or CFCs were being used by NCSP. We did however find three air conditioning units using the HCFC R22 (HCFCs are less damaging than Halons and CFCs however they are still being slowly phased out under the Montreal Protocol). As a result of this finding, we have prioritised the replacement of these units in our 2004 budget programme with HFC class refrigerants.

Future plans

NCSP has planned to replace all the remaining air conditions using HCFC (R22) in 2004. We will continue to take every effort to ensure that any new refrigerant or fire fighting systems installed on site in future are done so without the use of CFCs or halons in accordance with our policy. This shall be done through strict contractual specifications and obligations.

Issue 4: Water use and wastewater

Wastewater discharges contribute to the contamination of surface water, of ground water, and of land and can indirectly affect aquatic ecosystems, human health, and livelihoods.

The consumption of water by NCSP also represents the use of a natural resource.

Impact

NCSP uses water for sanitation, fire systems and equipment cleaning. This water is supplied from the local Water Supply Company. During the dry season (November – April) grey water (from our sewage treatment plant) is also used for irrigation of our Gas Processing terminal site.

Our wastewater is discharged into the Cua Lap River. Wastewater sources include onsite sewage and sanitary effluent, firewater (released during fire drills etc), water used to clean our process equipment, and rainwater run-off. These wastewater streams have the potential to affect the quality of water in the river thereby indirectly affecting biodiversity, presenting a health risk to other water users in the area, and also a loss of income for persons that depend on the quality of the river water for their livelihood (e.g. through fishing or salt production).

Management

Operational controls

The only NCSP facility to use and discharge wastewater is our Gas Processing terminal at Dinh Co. At the terminal there are four wastewater drainage systems including oily water drainage (in our high pollution risk process areas), contaminated drainage (in process areas with a lower risk of pollution), storm drainage outside our process areas, and sewage drainage (for our administration buildings). All waters collected within our process areas (including storm water and fire water) are directed through either the oily water or contaminated drainage system to our onsite industrial wastewater treatment plant. All sanitary wastewater is drained to our onsite sewage treatment facility.

Our industrial wastewater treatment system comprises an oily water basin and contaminated wastewater basin. Wastewater contained in the oily water basin is treated to remove oil and hydrocarbons in water to less than 5ppm as required under Vietnamese standards. Thereafter it is released to the Cua Lap river. Wastewater contained in our contaminated wastewater basin is not immediately treated. Rather, samples are taken and analysed at our onsite laboratory before any discharge of this water into the Cua Lap river. In the event that laboratory analysis shows an oil in water content of greater than 5ppm, this wastewater is redirected through to the oily water basin for further treatment. We also monitor the oil in water content of treated process water (at the point of discharge to the contaminated wastewater basin) using an online analyser.

Sanitary wastewater, from toilets, sinks, and the canteen is treated in a package sewage treatment system designed to ensure discharge is compliant with Vietnamese wastewater standards. Treated 'grey' water is then released to the Cua Lap river (during the rainy season) or reused on site for irrigation (during the dry season). Treated sanitary wastewater is sampled and analysed daily for parameters such as temperature, dissolved oxygen (DO) concentration, colour, activated sludge settlement state and residue chlorine. Other parameters such as Chemical Oxygen Demand (COD), Biological Oxygen Demand (BOD), and Total Suspended Solids (TSS) are measured quarterly and reported to the local environmental authorities.

NCSP also implements a rigorous maintenance programme for its wastewater treatment and drainage facilities to ensure that they are working to full efficiency and that the quality of all discharges is in full compliance with relevant Vietnamese standards.

Objectives and targets

We have undertaken to achieve zero discharge of sanitary wastewater during the dry season by treating sanitary wastewater to 1 Coliform count / litre and then using the grey water for onsite irrigation.

For our wastewater discharge from process areas, we have targeted no more than 5ppm oil in water content. This is in accordance with Vietnamese water quality standards.

Investigation

We are also committed to maximising our efficiency in water use, thereby reducing our water consumption and our discharge. We are therefore investigating ways to maximise the efficiency of reusing wastewater within our processes, our cooling water systems or for irrigation.

Performance

NCSP consumed a total of 17,527m^3 of water in 2003 for process and sanitary uses.

Water generated in process areas

We discharged approximately 50,000m^3 of wastewater from our process area in 2003, the majority of which was rainwater.

Our monitoring results have consistently shown that we have achieved oil in water content of approximately 2 ppm throughout 2003. This is well within our target of 5ppm. Furthermore, third party monitoring conducted in July 2003 confirmed that the process wastewater discharge was compliant with all Vietnamese standards, as shown in *Table 4.1*.

Table 4.1 – Monitoring results of wastewater at process area in July 2003

Indicators	Requirements of TCVN 6984 – 2001	Results
pH	6-8.5	6.75 – 7.15
COD	60-100	8 - 50
BOD_5	30 – 50	6 - 24
Suspended solid	80 – 100	25 - 100
Pb	0.5	Not detected
Cd	0.01 – 0.02	Not detected
Fe	3-5	0.15 – 1.3
Cl^-	750-1000	1 - 6
PO_4^{3-}	0.5-1	0.01
Oil	5-10	0 - 0.1

Notes:

- The permissible values depend on flow rate of river and discharge flow
- TCVN 6984: 2001 – Water quality – Standards for industrial effluents discharged into rivers using for protection of aquatic life
- Samples were taken from contaminated wastewater basin and oily water basin, therefore two results were given
- Source: Institute of Sanitary and Public Health, July 2003.

Sewage water

Our goal is to achieve zero discharge of sanitary wastewater during the dry season by reusing treated water (grey water) for onsite irrigation. Except for periods of equipment failure, this objective has been met. We have however set ourselves the objective in 2004 to improve the efficiency and operation of the irrigation system so that we can fully meet this target.

Monitoring results for our sanitary wastewater discharge during 2003 show that we are meeting all Vietnamese standards with the exception of phosphate, as shown in *Table 4.2.*

Table 4.2: Monitoring results of sewage water in July 2003

Indicators	Requirements of TCVN 6772 – 2000	**Results**
pH	5-9	5.8
H_2S	*1-4*	Not detected
BOD_5	30-200	16
Suspended solid 105^0C	50-100	125
PO_4^{3-}	6-10	15.65
Oil	-	0

Notes:
The permissible values depend on use of the receiving water body
TCVN 6772: 2000 – Water quality – Domestic wastewater standards
Source: Institute of Sanitary and Public Health, July 2003

We are currently investigating the cause of this exceedance and are taking every effort to ensure that our discharge meets legal standards.

Future plans

In 2004, we have budgeted to review, upgrade, and expand our irrigation system so that we fully achieve our commitment of zero discharge of sanitary wastewater during the dry season. In 2004, we have also budgeted to:

- Determine baseline for service water in order to set target for 2005;
- Reduce impact of water discharges to the Cua Lap River by reducing wastewater volume (i.e. reuse of wastewater for irrigation in dry season);
- Continue our regular monitoring programme, including third party monitoring every six months, to ensure that we are meeting all relevant wastewater discharge standards; and
- Consider installing a groundwater well for irrigation purposes.

Issue 5: Waste Management

The disposal of wastes:

- Requires the use of land (e.g. for sanitary landfill sites),
- May result in contamination of soils, surface, and groundwater;
- Hazardous wastes also require treatment with associated air pollution and health issues.

Impact

NCSP generates non-hazardous wastes (e.g. wood, metal, paper, general office wastes, glass, packaging, and canteen waste) and hazardous wastes (e.g. used oil and lubricants, cloth, rags, and containers contaminated with oil or chemicals, used filters, light fittings, batteries, and sludge from the waste water treatment plant).

Non hazardous wastes are disposed of to sanitary landfill sites. These require land and the disposal of such wastes can also adversely affect the environment in terms of local air pollution, odour, attracting pestilence and contamination of soils, surface, and groundwater.

Hazardous wastes require treatment such as incineration before they can be disposed of (e.g. to landfill). Incineration can release harmful pollutants into the atmosphere affecting local air pollution and indirectly impacting people's health and ecology. The ash generated after incineration is then often disposed to landfill (or can also be stabilised e.g. into bricks for reuse) with resulting risks of soil and groundwater contamination, surface water pollution etc. The transport and storage of hazardous wastes also poses risks to human health and safety and potential contamination.

In addition, waste also represents inefficiency in the use of raw materials.

Management

Operational controls

NCSP implements a comprehensive waste management procedure that aims to ensure that the highest standards in waste management are achieved throughout our operations. It is also our policy to conserve company and natural resources by careful management of discharges and by eliminating unnecessary waste generation. Every attempt is therefore made to handle waste in accordance with the following principles (listed in order of priority);

- Waste generation and consequences are considered from the outset of all activities;
- Waste generation is eliminated where possible;
- Waste generation is reduced at source;
- Reuse of waste materials;
- Recycling / recovery of waste materials;
- Disposal will only be considered if the above options are not available.

The following operational procedures implemented at NCSP illustrate our commitment to these principles:

- We provide our staff with comprehensive environmental awareness training, which includes coverage of our waste management philosophy. We train our staff on the need to and how to minimise, recycle and segregate waste.

- We identify ways of minimising the amount of waste we generate including looking at options for waste minimisation, reuse, and recycling.

- We use colour-coded bins throughout our Gas Processing Terminal to facilitate waste segregation (e.g. green for non-hazardous waste, red for hazardous waste, yellow for medical waste etc.).

- We carefully selected our waste contractors to ensure they worked in compliance with Vietnamese legal requirements and best practices in waste management. We audit their premises and activities before signing contracts with them and make regular visits to them to ensure they are working within our contractual conditions.

- We have established a "Green Team" to help with implementation of our waste management procedure as well as other environmental issues. The team, whose members include participants from every NCSP team is responsible for improving environmental performance at site through awareness raising activities.

- We maintain a detailed waste consignment recording system. Our Warehouse supervisor is responsible for maintaining a Waste Tracking Database of all waste types and volumes / weight which are sent for disposal. We check this against the records or our contractors.

- We actively work with and support our contractors to improve their waste management

practices and operational efficiencies.

Objectives and targets

For 2003, we set ourselves the following specific objectives and targets:

- To operate a Waste Tracking Database to record the type, amount and disposal route for all waste;
- To understand what wastes we generate enabling us to target waste minimisation, reuse, recycling and other waste management objectives for the future.

Investigation
In 2003, we sought to investigate opportunities for reducing the generation of waste at source.

Performance

In 2003, NCSP disposed a total 117.95 tonnes of non-hazardous waste and 506 tonnes of hazardous waste. We recycled 24.5 tonnes for non-hazardous wastes (mainly paper, wood and scrap metal) and 1 tonne of hazardous wastes (empty drums). *Figure 4.2* illustrates the waste generated by NCSP in 2003 by type and *Figure 4.3* shows volume of non-hazardous and hazardous waste generated by month during 2003.

Figure 4.2 shows that the volume of non- hazardous waste generated in 2003 comprised of mainly canteen or domestic waste. This also included a small volume of recyclable waste such as cardboard, paper, etc. Hazardous wastes generated by NCSP in 2003 included waste oil, oily rags, condensate, waste chemicals, wastewater filters, and empty drums.

Figure 4.2: Summary of Types of Waste Generated by NCSP in 2003

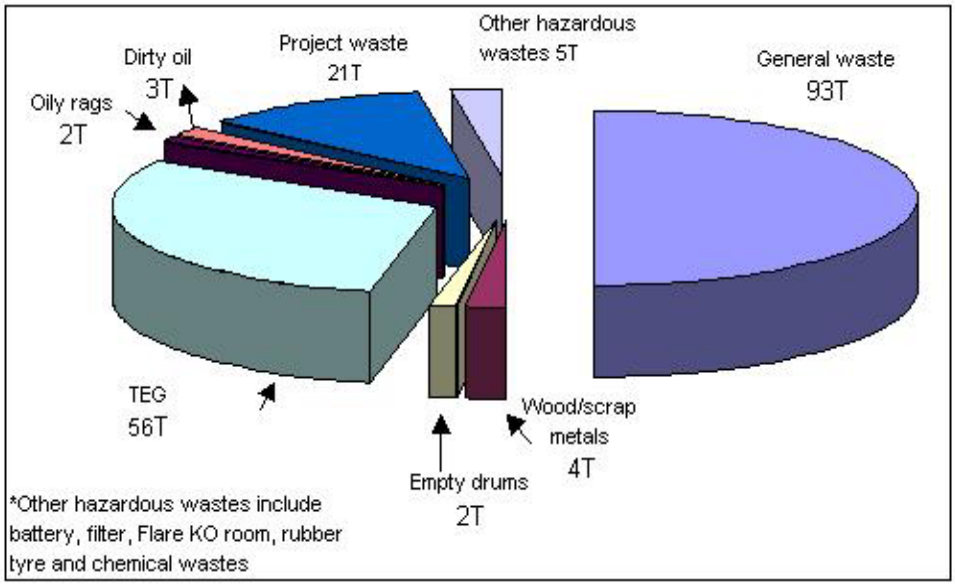


Figure 4.3: Volume of Hazardous and Non-hazardous Waste generated in 2003

The hazardous waste generated in February was 43 tonnes of Tri Ethyl Glycol (TEG) which is used for pipeline maintenance. In addition, in May 2003, 439 tonnes of hazardous liquid waste was generated during maintenance of the NCSP. This volume is excluded from *Figure 4.3* as it was an exceptional circumstance.

In 2003, we carried out the following activities which illustrate the implementation of our waste management procedure:

- We initiated an awareness campaign targeted at reducing waste paper by printing on both sides, reusing paper (e.g. 100kg of waste paper was donated to a local kindergarten for their use), and identifying ways to recycle paper.
- We audited our hazardous waste management contractors to ensure their compliance with our contractual and Vietnamese legal requirements.
- We carried out an internal audit in September 2003 to review our waste management process. The audit looked at the documentation of waste and our management practices to identify any gaps requiring improvement. There were no major findings.
- We worked with our waste management contractors to help them improve their waste management practices and efficiencies. For example, in December 2003, we co-sponsored a workshop on hazardous waste management attended by our waste contractors, the local authority and other oil and gas companies. Its aim was to drive best practice in hazardous waste management.
- We organised a number of public awareness campaigns on waste management including a Beach Clean in Long Hai (where our pipeline makes landfall) and a Rubbish Clearance Day. We also conducted various forms of internal training on waste management for our staff.

Future plans

In 2004, we plan to:

- Increase percentage of paper recycled;
- Reduce the production of hazardous waste by 5% (from 2003 levels);
- Investigate whether it is feasible (on commercial and environmental grounds) to add

waste lubricant oil to our condensate product;
- Obtain the local environment authority's certification that we are a producer of hazardous waste; and
- Audit each of our waste contractors at least once during the year.

Issue 6: Accidental spills

Spills of chemicals or oil result in land, surface and groundwater contamination, vegetation damage, ecological impacts, and potential human health and livelihood implications. Spills may also pose a risk of explosion or fire.

Impact

Spills can occur as a result of equipment failure, pipeline deterioration or third-party damage. Spills can have long-term consequences for the environment and for neighbouring communities through the contamination of land, pollution of surface and groundwater, damage to vegetation and wildlife and can affect people's livelihoods and health.

The operation of NCSP has the potential to create spills of chemicals, condensate, gas, or of hazardous waste.

Management

Operational controls

NCSP treats the risk of spills and accidents with the highest priority and implement strict measures to ensure that all our operations are undertaken with the highest regard to risk reduction.

To prevent accidental spills occurring we implement a number of measures including:

- Regular inspections and integrity checks via Advanced Safety Audit (ASA) or frequent area inspections (the responsibility of every staff member) and daily patrols along the whole length of our onshore pipelines. For our offshore pipeline, we regularly check for mechanical integrity using automated equipment. We also implement an Integrity Management Plan (IMP) to minimise the risk of spills or leaks.

- Provision of oil spill kits; and

- Maintaining the integrity of the site's concrete drainage system

In the event that a spill should occur, we implement a detailed Spill Contingency Plan to minimise its impact. The Plan describes hydrocarbon and chemical spill response procedures, how assistance should be mobilised, how a response strategy should be selected and how to minimise the extent and impact of a spill. It also clearly designates responsibilities of staff, describes emergency procedures and reporting requirements.

To support our spill prevention and response approach, we also regularly hold internal training and spill response drills so that all staff working on site is confident of how to react in the event of an accident.

Targets / Objectives

Our principle target is no discharge of oil or chemicals to land.
Performance
In 2003, we are confident that we achieved our target of no discharge of oil or chemicals to land and water. Whilst we did record three accidental spills, impacts were prevented as follows: • In February 2003, 150 litres of lubricant oil was lost to the oily water drain. The spill was contained within our process area drain system which drains to our industrial waste water treatment plant. All the effluent was treated to within 5ppm oil in water content as required by law and before releasing the treated effluent offsite, we ensured that its quality met the relevant Vietnamese standards. • In May 2003, a pinhole leak was discovered on a hydraulic hose at Long Hai. The small volume of gravel that became contaminated by oil, was collected and treated by our hazardous waste management contractor. • In November 2003, 1,200 litres of fire fighting foam was accidentally released to the oily water treatment system. Like the earlier accidental release of lubricant oil, the spill was treated within the onsite wastewater treatment plant and resulting discharge was in full compliance with Vietnamese wastewater discharge standards.
Future plans
In 2004, we plan to maintain our target of 'No discharge (of oil or chemicals) to land and water'. We also aim to minimise environmental damage due to unplanned event (e.g. spills).

Other objectives and targets

In addition to our performance against the specific environmental issues described above, NCSP also gave itself additional objectives and targets in 2003 relevant to environmental management. Our achievements against these additional benchmarks are presented in *Table 4.3* below.

Table 4.3: Our performance against additional objectives and targets in 2003

Objective	Target	Status
Develop and implement a system for identifying and actioning short term improvement options	Implement Action Tracking System which enables the HSE team to monitor and analyse the implementation of HSE actions.	We implemented the "Tr@ction" tracking system. Every HSE action related for example to an incident investigation, is recorded, a responsibility assigned and a target date set. The system alerts the responsible person of any impending deadlines and a monthly report also highlights any outstanding actions to all staff.
Establish and maintain a high level of environmental awareness within NCSP	Increase awareness of environmental issues among NCSP personnel during 2003	We implemented numerous internal awareness raising programmes during 2003 including: • Training course on Waste Management Awareness for all NCSP staff;

Objective	Target	Status
		• Training course on Environmental Management System (EMS) for all NCSP staff; and • Contest on Waste Management
Establish a reliable environmental reporting system which allows data to be readily shared	Implement improved system by end June 2003	We have developed the Vietnam Document Access System (VDAS) which became accessible to all NCSP users. VDAS records all HSE-related procedures, investigation reports, performance and programmes. It also contains all information relating to our ISO 14001 environmental management system.

Furthermore, NCSP has also played an active role in environmental protection in the community. We have supported – financially and through our staff a number of environmental programmes during 2003, for example:

- We have been supporting the conservation of Cuc Phuong National Park which is home to many endangered species of flora and fauna. Undertaken in partnership with the Ministry of Agriculture and Rural Development and Fauna and Flora International, the project's most significant outcome has been the education of local people in natural resource conservation techniques, allowing the project to be handed over to a well-trained local team.

- In association with Fauna and Flora International, we supported the establishment of a national marine environment centre, which will develop a model for community-based conservation in Vietnam's coastal communities. The project specifically targets two of Vietnam's national marine parks, on the island of Cat Ba in Ha Long city and on Con Dao Island in Ba Ria Vung Tau province.

- We helped local people to replant fruit trees on a 20-hectare site on Con Dao island.

Summary of Performance in 2003 and our Targets for 2004

In *Table 4.4* we summarise our performance against our environmental objectives in 2003. In *Table 4.5* we then summarise the objectives we aim to achieve in 2004.

Table 4.4: Summary of Performance of NCSP in 2003

Objective	Reporting Year Target	Reporting Year Actual
Greenhouse Gas Emissions Understand operational emissions of CO_2 and other GHGs in order to set future improvement targets	GHG emission <23,300 tonnes	• Actual calculated GHG emissions in 2003 were 17,000 tonnes.
Air Emissions: Meet all relevant legal requirements.	Meet all relevant legal standards	• All relevant Vietnamese standards were met.
Ozone Depleting Substances	No use of halons or CFCs	• We carried out a full NCSP inspection which confirmed that this objective has been met.
Wastewater: To reduce the impact of hydrocarbon discharged to local river	Oil in water content must not exceed < 5ppm on discharge Zero discharge of sanitary wastewater during the dry season using the grey water for onsite irrigation	• Oil in water content was maintained at <5ppm throughout the year and on average was 2ppm. • Zero discharge of treated sanitary effluent was met except during periods of equipment failure.
Water consumption: Improve management of water resources	Reduce water use Reuse grey water for irrigation in the dry season	• In 2003 we used 17,527m^3water • We reused our sanitary grey water for site irrigation except during periods of equipment failure.
Waste Management: Establish environmentally sound waste management practices and options for improvement	Develop and implement waste management procedure	• A comprehensive waste management procedure has been developed and implemented.

Table 4.5: Summary of Objectives and Targets for NCSP for 2004

Goal / Objective	Target for 2004
Greenhouse Gas Emissions: Minimise the impacts caused by the emissions of CO_2 and GHGs	• Achieve continual improvement on reducing flaring by focusing on leak detection and eliminating defects. • Achieve GHG emissions of 15,400 tonnes (CO_2 equivalent).
Air Emissions: meet all relevant legal requirements	• Take and analyse emissions samples from gas turbine stack.
Ozone Depleting Substances: No use of halons / CFCs	• Replace 3 air conditioning units found to use the HCFC R-22.
Wastewater: Improve wastewater management	• Upgrade and expand the irrigation system to achieve zero sanitary wastewater discharge during the dry season; • Determine baseline water usage in order to set future targets. • Consider installing a groundwater well; and • Implement internal audit programme in water discharge in order ensure compliant of relevant legal requirements.
Waste Management: Improve waste management	• Increase percentage of paper recycled • Reduce the volume of hazardous waste by 5% compared to 2003. • Investigate the feasibility of returning waste hydrocarbons to the condensate product • Obtain local environment authority's certification of being a hazardous waste generator • Implement internal audit programme on waste management.
Accidental Spills: Minimise environmental damage due to Unplanned Events (e.g. Spills)	• Achieve no discharge (of oil or chemicals) to land and water.

VI- Further information

How we determine our CO_2 emissions

In accordance with BP Group Reporting Guidelines, we make a simple calculation of CO_2 which takes into account:

- The volume of diesel used;
- The volume of fuel gas used;
- The volume of flare gas used; and
- The chemical composition of the gas and diesel we use and the volume of GHGs emitted when burnt.

Glossary

BOD	Biological Oxygen Demand
CFCs	Chlorofluorocarbons
CO	Carbon Monoxide
CO_2	Carbon Dioxide
COD	Chemical Oxygen Demand
DoNRE	Department of Natural Resources and Environment
EMS	Environmental Management System
ESD	Emergency Shutdown
GDC (Phu My)	Gas Distribution Centre at Phu My
GHGs	Greenhouse Gases
HCFC	Hydro chlorofluorocarbons
HSE	Health, Safety, and Environment
ISO	International Standards Organisation
MScm	Million Standard Cubic Metres
NCSGP	Nam Con Son Gas Project
NCSP	Nam Con Son Pipeline
Nox	Nitrogen oxides
ODSs	Ozone depleting substances
Ppm	Parts per million
PSV	Pressure Shutdown Valve
SO_x	Sulphur oxides
TSS	Total Suspended Solids
VOCs	Volatile organic compounds

Feedback

Tell us what you think. Are our statements easy to understand, not detailed enough or perhaps too complicated?

Is there any further information in which you are interested? Let us know what you think so we can improve our environmental reporting. If you have any queries about this report or general operations, please write or telephone us and we will be happy to assist.

Contact Person:

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To: Do Ba Canh

The next NCSP Environmental Statement will be issued by 30th May 2005 and will cover the period 2004.

Verification Statement

"We have independently reviewed the NCSP Environmental Statement and conclude it represents a true and fair reflection of the environmental programmes and performance within 2003. We have found no statements in this report which we have been unable to substantiate and verify through observations, visits, and review of the appropriate systems."

Signed: _____ Date: 2 NOV 04'

(Eric Kaljo Roos, DNV-Jakarta, Indonesia)

Annex 1 : Register of Environmental Impacts of NCSP's operations considered to be significant

The following register summarises the negative impacts of NCSP operations we have identified as being **significant**. The information is based on reference OPS 3000-LES-2002, dated 1 May 2003.

Activity	N/E/A	Input / Output	Impact
Workshop / labs	N	Use of chemical / Disposal of hazardous liquid waste	Water pollution, damage to ecosystem
Vehicle use (fire engines, ambulance, trucks, etc.)		Use of vehicles / vehicle emissions	Global warming, ozone depletion, local air pollution
Waste	N	Transportation of waste to disposal site / vehicle emissions	Global warming, ground level ozone, fire / explosion / escalation
		Transportation of waste to disposal site / loss of containment	Water pollution, land pollution
	A	Hazardous waste storage/ leak or loss of containment of hazardous wastes	Water pollution, damage to marine ecosystem
	N	Generation of waste / waste of resources	Resource use
	A	Storage and handling of waste / leak or loss of containment of wastes	Land contamination odour, groundwater contamination
	N	Recycling of waste materials / Onshore disposal	Minimisation of waste disposal impacts
	N	General and galley waste disposal / onshore disposal landfill	Land and groundwater contamination, methane gas emissions
	N	Medical waste / onshore disposal – incineration	Atmospheric emissions, global warming, local air pollution
Third party supply of goods and services	N	Environmental impacts from activities from service and goods providers / emissions and discharges from manufacturing construction, etc.	Waste disposal effects, air emissions, land contamination
Flare system	A	Non-routine gas flaring, e.g. PSV leaks, maintenance depressurisations, compressor trips / use of non-renewable fossil fuels, emissions of CO_2, CO, NO_x, SO_x, CH_4, VOCs	Resource use, global warming, acid rain, groundwater ozone, heat emissions

Activity	N/E/A	Input / Output	Impact
	N	Routine flared purge and pilot gas / use of non-renewable fossil fuel, emissions of CO_2, CO, NO_x, SO_x, CH_4, VOCs	Resource use, global warming, acid rain, ground level ozone, heat emissions
	E	Emergency depressurisation and PSV operation resulting in increased flaring / use of non-renewable fossil fuels, emissions of CO_2, CO, NO_x, SO_x, CH_4, VOCs	Resource use, global warming, acid rain, groundwater ozone, heat emissions
	A	Cold flaring/ emissions of CH_4 and VOC	Global warming, ozone depletion
	E	Mechanical failure, human error, corrosion, etc. / gas release – emissions of CH_4 and VOC	Global warming, Ground level ozone, fire / explosion / escalation
Fire water system	A	Maintenance of pump / waste oil spill	Land pollution
		Water use/ resource use	
	E	Combustion of diesel / release of combustion emissions to atmosphere	Resource use, global warming, acid rain, ground level ozone, heat emissions
Foam system	E	Storage of APFF/ spillage of APFF	Land pollution
Emergency power	A/E	Combustion of diesel in emergency diesel engines/diesel use. Emissions of CO_2, CO, NO_x, SO_x, CH_4, VOCs, water vapour, heat, noise	Resource use, global warming, acid rain, ground level ozone, heat emissions
Fuel gas	E	Gas leak, loss of containment/ release of fuel gas	Global warming, ozone depletion, fire / explosion escalation
Chemical injection	E	Storage of drums and tole tanks / loss of containment	Wastewater accumulated
	E	Storage of drums and tole tanks / small leaks of and spills	Wastewater accumulated
	E	Decanting of chemicals – transfer from storage to injection system / leaks, spills	Water pollution, land pollution
	E	Distribution of chemicals / leaks, spills from pipe-work	Water pollution, damage to marine ecosystem, land pollution
Heating medium	E	Distribution of hot oil / leak, spill of hot oil	Water/ land pollution
		Decant of hot oil to top up system/ spill	Water pollution, land pollution
Sewage system	N	Treatment of sewage / discharge of treated sewage water to land / storm water drains	Land pollution, water pollution, damage to ecosystem
Hydraulic	E	Instrument failure / oil spill	Land pollution

Activity	N/E/A	Input / Output	Impact
Contaminated/ oily water treatment	A	Online analyser fail to detect oil in water (OIW) concentration / off-spec water dispose to the river	Water pollution, damage to ecosystem
Accommodation/ offices	N	Gray water disposal / disposal to river via water treatment system	Water pollution, damage to ecosystem
	A	Refrigerants in domestic fridge and freezers / minor leaks	Global warming
	N	Operation of air conditioning / Release of R22	Ozone depletion
Gas processing system	N	Fugitive emissions from valves / release of gas to atmosphere	Global warming
	E	Instrument failure, human error / release of gas to atmosphere	Global warming, ozone depletion, fire / explosion escalation
	A	Depressurise to flare during maintenance operations / combustion of gas to atmosphere	Global warming, ozone depletion, fire / explosion escalation
	E	Blow-down, gas to flare / venting gas to atmosphere	Global warming, ozone depletion
	A	Blow-down, gas to flare / Combustion of gas to flare	Global warming, ozone depletion
	A	Gas leak / gas released to atmosphere, possibly H2S	Global warming, ozone depletion
Gas processing system – compressors	N	Energy use / resource usage	Depletion of natural resources
	A	Gas compressor trips / gas from condensate stabilisation tower will go to flare rather than with sales gas	Global warming, ozone depletion, fire / explosion escalation
Gas processing system – cooling water systems	A	Water usage / resource usage	Water resource depletion
Condensate storage and export system	E	Condensate transfer to GPP via pipeline / leak from pipeline	Water pollution, damage to marine ecosystem, fire / explosion / escalation
	E	Condensate transfer from GPP to Thi Vai / leak from pipeline	Water pollution, damage to marine ecosystem, fire / explosion / escalation
	N	Fugitive emissions from condensate tank / release of emissions to atmosphere	Global warming, ozone depletion, fire / explosion / escalation, aromatics
	E	Tanker loading facilities / leak of condensate to storm-water drains if bunding fails – discharge to river	Damage to water body ecosystem
	N	Tanker transportation offshore / vehicle emissions	Global warming, ozone depletion, fire. Explosion / escalation

Activity	N/E/A	Input / Output	Impact
	E	Rupture of transportation tanker / discharge of condensate to environment	Water body pollution, groundwater pollution, land pollution, damage to land ecosystem, fire / explosion / escalation
Condensate processing train	E	Instrument failure, human error / condensate spill	Land pollution, damage to land ecosystem, fire / explosion / escalation
Sphere receiver	A	Depressurising sphere receiver / venting of gas to atmosphere through local vent	Global warming, ozone depletion, fire / explosion / escalation
	A	Sphere cleaning, sizing and disposal / use and disposal of glycol	Land contamination, resource use
Import pipeline – landfall to Dinh Co	A	Minor pipeline leakage / release of hydrocarbon gases and liquids to land / water	Water pollution, damage to water bodies, global warming, ozone depletion, fire / explosion / escalation
	E	Major pipeline rupture, corrosion, rupture by ship anchors / release of gas and condensate	Water pollution, damage to water bodies, global warming, ozone depletion, fire / explosion / escalation
	A	Leak of hydraulic oil from emergency shutdown (ESD) valve / release of hydraulic oil to ground	Ground contamination
Pipeline Dinh Co-Phu My GDC	E	Major pipeline rupture, corrosion, flanges / release of gas, cold venting	Global warming, ozone depletion, fire / explosion / escalation
	A	Leak of hydraulic oil from emergency shutdown (ESD) valve / release of hydraulic oil to ground	Ground contamination
Slug catcher	A	Manual removal of water from flare knockout drum / transport offsite for disposal	Air emissions, land contamination
	E	Catastrophic failure of slug catcher	Air emissions, land contamination
	A	Leak, seep, weeps from flanges / gas or condensate to air or ground	Air emissions, land contamination
	E	Emergency blow-down or Pressure shutdown valve (PSV) release / gas combustion at flare	Atmospheric emissions, global warming, ozone depletion
	A	Debris or slug collection / removal of debris for disposal	Impacts from debris offsite disposal
Gas metering system – at Phu My GDC	A	Minor gas leak / release of gas to atmosphere	Global warming, ozone depletion, fire / explosion / escalation
	N	Leak from PSV / release of gas to PV GDC flare	Global warming, ozone depletion, fire / explosion / escalation
	A	Depressurisation for maintenance / gas to PV GDC flare	Global warming, ozone depletion, fire / explosion / escalation

Activity	N/E/A	Input / Output	Impact
	E	Emergency depressurisation / gas to PV GDC flare	Global warming, ozone depletion, fire / explosion / escalation
	E	Depressurisation to local vent (when PVGDC flare not in operation) / gas vent to atmosphere	Global warming, ozone depletion, fire / explosion / escalation

Abbreviations: **N** – Normal operations, **E** – Emergency situations, **A** – Abnormal operations