



# Tangguh LNG Verified Site Report 2011



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## Foreword

Tangguh LNG is committed to conduct business in a manner that benefits the country and communities involved with Tangguh LNG operations. This commitment includes making every reasonable effort to minimize potential impacts to the environment, through compliance with statutory requirements, control of environmental and social impacts, and protection of employees, contractors, and the surrounding communities.

Compliance with the approved Tangguh Integrated social and environmental impact assessment (AMDAL) and relevant Indonesian environmental regulations, and fulfillment of the commitments embodied in Tangguh LNG's philosophies and policies must be realized for Tangguh LNG operations to be successful.

This Verified Site Report outlines the environmental management system in place for Tangguh LNG Operations in Indonesia for the period of January - December 2011. This report is part of our commitment to transparently report our environmental management and monitoring performance to our stakeholders.



Andy Thain  
VP Operations - Asia Pacific

# Introduction

In the day-to-day operations, Tangguh LNG abides by the AsPac Region HSSE and Operating Policy (below) to ensure consistent delivery of safe, reliable and efficient operations.



**BP E&P Asia Pacific Region**

## ASIA PACIFIC REGION HSSE AND OPERATING POLICY

Everybody who works for BP E&P Asia Pacific Region, is committed to consistent delivery of safe, reliable, and efficient operations. We operate our business in conformance with the BP Code and Conduct and aligned with the OMS framework. Good HSSE performance is critical to the success of our business.

**Our goals are simply stated - no accidents, no harm to people, and no damage to the environment.**

We will:

- Comply with all applicable laws and regulations and any other requirements to which the company subscribes
- Work with key stakeholders - partners, suppliers, competitors and regulators - to raise the standards of our industry
- Systematically manage our operating activities to continuously reduce risks and deliver performance improvement consistent with our local OMS
- Look for, and immediately report hazards; take action and learn from incidents
- Ensure that all personnel are physically and mentally fit to perform their duties
- Continue to minimize the potential environmental and health impact of our operations by implementing sound environmental management and monitoring programs; by reducing waste and emissions; and by using energy efficiently.
- Consult, listen and respond openly to our customers, employees, neighbours, public interest groups and those who work with us
- Hold line management accountable for HSSE performance
- Support sustainable development of our communities, through wise use of natural resources, and protection of biodiversity
- Recognize and reward those who contribute to outstanding HSSE performance
- Monitor, openly report and take appropriate action to continually improve our HSSE performance
- Communicate to all personnel that no job is so important that we cannot take the time to do it safely
- Continuously improve the leadership capability and capacity of our organization

Our business plans include measurable HSSE targets. We are all committed to meeting them and continually improve our HSSE performance through the local OMS and periodical review.

**Safety is everyone's business and all personnel have a responsibility to stop work that is not safe**

December 2011



**William Lin**  
President Regional Asia Pacific

# Description of Our Operations

Tangguh LNG is a grassroots facility for producing LNG and condensate. The LNG plant site is located on the southern shores of Bintuni Bay in Bintuni Bay Regency of Papua Barat Province. The gas resource for Tangguh LNG is sourced from six natural gas fields: Vorwata, Wiriagar Deep, Ofaweri, Roabiba, Ubadari, and Vos. The current development includes all facilities for the production, collection, and transmission of natural gas and associated liquids from the Vorwata area. The gas is produced from offshore locations and transported via pipelines to an onshore LNG plant to be purified and liquefied into LNG for export by LNG tankers.



Figure 1 : Tangguh LNG Location

The initial development includes two offshore platforms in water depths of 50m to 60m located in the Vorwata field designated VR-A and VR-B. Fifteen wells have been drilled from these two platforms. A total of nine wells were drilled from the VR-B platform, one well was temporarily abandoned for technical reasons. Six wells are in production at the VR-A platform. The well depths are about 4600m.

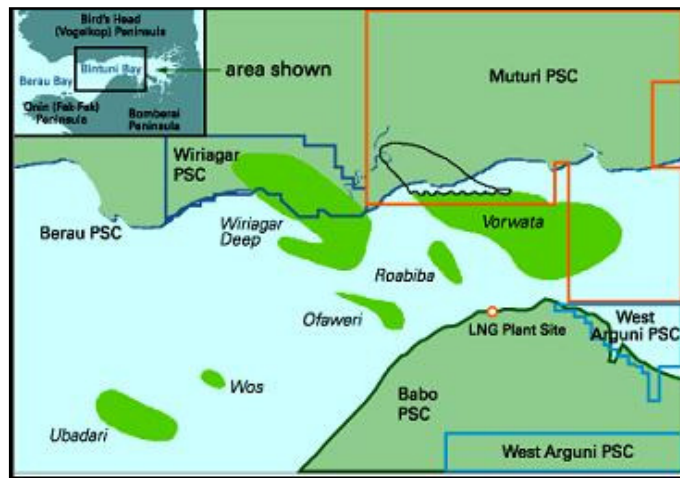


Figure 2 : Tangguh Gas Reservoir

The gas is transported from the VR-A and VR-B platforms by two separate 61cm (24") diameter subsea pipelines of approximately 20.5km and 19.3km in length respectively to the Onshore Receiving Facilities (ORF) at the Tangguh LNG plant where it is processed into LNG.

The LNG plant initially comprises of two production trains with an annual production capacity of maximum 7.6 million tones. An LNG train consists of equipment that purifies and liquefies the natural gas, complete with LNG tanks and condensate tank. Supporting facilities such as offices, accommodation, clinic, warehouse, marine facilities, waste management facilities and workshop are available at site. In addition to the main facilities at Tangguh LNG site, Tangguh LNG also operates small camp, airfield and jetty at Babo. Babo is about 1.5 hour by boat from Tangguh LNG site.

In 2011, Tangguh LNG has reached design operation capacity and has conducted 95 LNG and 23 condensate shipment.

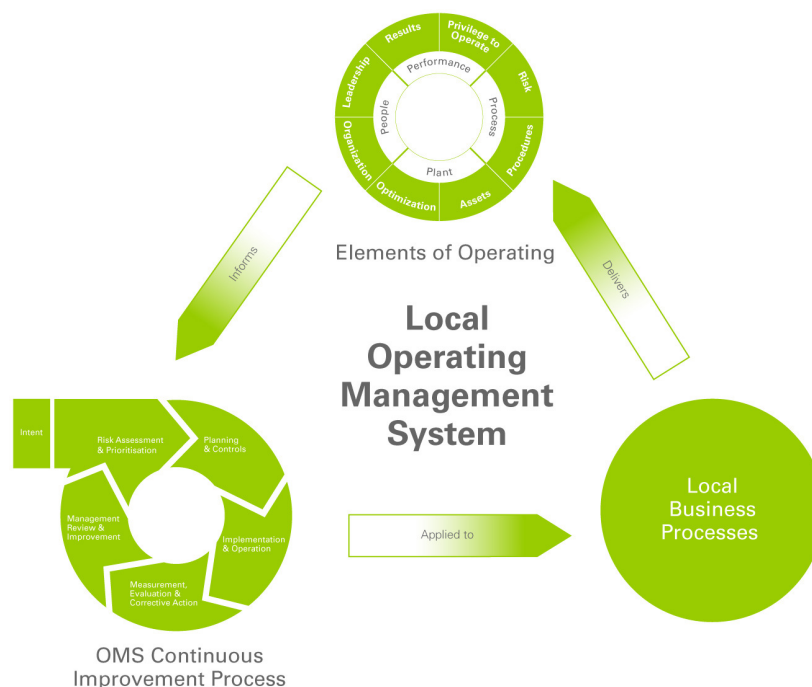


**Figure 3: LNG plant and its supporting facilities**

# Management System

Tangguh LNG started implementing its Operating Management System (OMS) throughout its operations in 2011. OMS is a global BP framework that defines a set of operating requirements. It sets out a systematic way to improve local business processes to deliver these requirements. When fully implemented, OMS helps to deliver safe, responsible and reliable operating activity and enables continuous performance improvement.

Environmental Management System (EMS) is part of OMS Element 3.0 Risk. Sub Element 3.6. Environment that stipulates the need to identify and systematically manage the impact of activities on the environment, and integrate environmental requirements into the local OMS. Within the OMS Elements of Operating, it is mandated that major operating sites maintain external ISO 14001 certification. ISO 14001 is an international standard consisting of a set of requirements for EMS.



**Figure 4: Operating Management System**

Tangguh LNG EMS is established based on the requirements for ISO14001:2004 standard. It follows the concept of Plan – Do – Check – Action, in order to achieve environmental commitments as defined in the Asia Pacific Region HSSE and Operating Policy :

- comply with applicable law and regulations and any other requirements to which the company subscribes. This includes Tangguh Integrated AMDAL, applicable Indonesian regulations and permitting requirements, the Tangguh Lenders Group Standards and the BP Group Practices.
- Continue to minimize the potential environmental and health impact of our operations by implementing sound environmental management and monitoring program; by reducing waste and emissions; and by using energy efficiently.
- Support sustainable development of our communities, through wise use of natural resources and protection of biodiversity.

Tangguh LNG operations, including all supporting units at Tangguh site and Babo, are collectively managed under one ISO 14001 registration.

An EMS organization structure has been developed that is integrated with operational organization with respect to each individual leadership and commitment to environmental management. To ensure proper implementation of the system, a communication method is established, covering internal and external communication.



Figure 5: ISO 14001-2004 Elements

Departmental EMS champions and document control are assigned as the representative of each department. Current number of champions and document controls are more than 100 personnel representing all departments including major contractors, also to cover back-to-back position. Roles and responsibilities of the EMS champions and document control are developed to ensure clear delivery. EMS champions' meetings are conducted on a biweekly basis. An enhancement program on employees' awareness related to environmental management through various ISO14001 campaigns are ongoing using promotional materials, quiz, environmental flash, campaign events, and town hall meetings.

During 2008-2011, more than 3,200 personnel have participated in mandatory EMS awareness training. In addition, there were also more than 2,000 personnel attended specific trainings for various environmental topics, such as hazardous waste management, solid waste management, flora fauna and others.

External EMS audits by accreditation body and internal EMS audit are conducted on an annual basis. An annual management review meeting is conducted to review and evaluate the implementation of the system and EMS performance within the period of one year, and to identify opportunities for continual improvement. Prior to the meeting, Management Representative with support from EMS organization team shall evaluate all data and information required, and shall present the result in the meeting. Tangguh Area Operating Manager shall make necessary decision based on the result of the evaluation.



## How We Identify and Manage Environmental Impacts



Tangguh Integrated AMDAL (Environmental and Social Impact Assessment) document was completed and approved by Government of Indonesia in 2002.

As part of the ISO 14001 requirement, an aspect and impact register for each department was assessed and updated on a regular basis. The work involves identification of the environmental aspect of activities, including materials or resources (input) from Tangguh LNG Operations that may cause adverse or positive impact to the environment. The identification of aspect and impact covers current, past and future activities in 3 (three) conditions which are normal, abnormal and emergency condition.

Following the identification, an evaluation shall be conducted to define those environmental aspects that may cause significant potential impact, using the following criteria:

- Frequency and probability of impact
- Consequences and degree of impact
- Geographic distribution of impact
- Impact to business or cost
- Impact to public image (media or community)
- Time for the recovery

All environmental aspects having a score higher than average, or regulated with legal and other requirements, shall be classified as significant aspect. Significant means that environmental aspects and its associated activities and inputs shall be controlled within Tangguh LNG Operations EMS; through objective and target, operational control and/or monitoring.

Environmental aspects and impacts shall be reviewed at least every two years, or if there is any change of activities, after emergency and or changes in evaluation criteria.

### Our Aspects

This section describes significant environmental aspects identified through the risk ranking process at Tangguh LNG, and the environmental management plans that are developed to improve our performance and minimize potential environmental impacts.

Key environmental aspects in 2011 include:

- Wastewater discharge.
- Air emissions;
- Potential spills; and
- Solid waste and hazardous waste generation.



Tangguh LNG operations manage important environmental aspects of its activities through engineered controls, equipment, procedures and work instructions, and training needs based on environmental aspects, monitoring tools, and programs.

**Engineered controls and automated monitoring:** Equipment and processes are designed to maximize environmental protection. Management systems are used to schedule safety, environmental, and regulatory tasks and monitoring. A variety of monitoring systems are in place, such as on line continuous air emission monitoring at key facilities. This monitoring equipment is calibrated and tracked through the maintenance management system.

**Procedures and Working Instructions:** Environmental controlled copy document is electronically stored in the DOCUMENTUM and can be accessed by all Tangguh LNG personnel. The DOCUMENTUM is Tangguh LNG web-based document system. Only current or latest update documents are stored in the DOCUMENTUM.

**Objectives and targets:** Environmental objectives and targets are set by each department, with input from the environmental team, to help Tangguh LNG meet its environmental goals and manage high-ranked environmental aspects.

**Performance**

Performance is monitored through a monthly tracking that is maintained at multiple operating levels. The targets are compared and evaluated as satisfactory, unsatisfactory, or at-risk. Any non fulfillment of an EMS requirement or standard shall be followed up and recorded in the documentation system.

Tangguh LNG EMS performance is also tracked by regular weekly report, Champions and Document Control monthly meeting, as well as through gatherings and annual sharing sessions with Management Representative.

The efficiency and effectiveness of the EMS is evaluated within all levels of the organization. EMS Management Review Meetings are held once per year with site management and Tangguh Area Operating Manager. The meeting agenda includes the evaluation of compliance to requirements from the ISO 14001:2004 standard. The meetings provide the opportunity to identify deficiencies within the system and develop corrective and preventative action plans to improve efficiency.

**Future Plans**

Tangguh LNG will sustain the implementation of EMS ISO 14001, including striving for continuous improvement opportunities. Surveillance audit, internal audits and management reviews will be conducted on a regular basis as required under the ISO 14001 system.

## Air Emissions



Air emissions generated as part of Tangguh LNG plant operations include combustion (flaring) and release (venting) of hydrocarbon converted into CO<sub>2</sub>, combustion emissions from non-moving engines (gas turbines and diesel generator backup), combustion emissions from moving sources (ships, aircraft, vehicle), fugitive emissions, and emissions from combustion of flammable materials (incinerator).

Tangguh GHG emissions are generated mainly from LNG plant operation (flaring, fuel gas combustion and CO<sub>2</sub> from reservoir through Acid Gas Incinerators and flare). In 2011, flaring contributes to about 10.3% of total plant emission, while fuel gas combustion contributes about 35.7% with CO<sub>2</sub> from reservoir released through Acid Gas Incinerator (AGI) or flare making a major contribution of 54%. Tangguh feed gas contains about 12% of CO<sub>2</sub>. Fuel combustion (diesel/gasoline/aviation fuel) only contributes approximately 1% from the total emission.

### Impact

If not managed properly, NO<sub>x</sub> and SO<sub>x</sub> can combine with water in the atmosphere to form acid rain that impacts several parts of the environment such as water, land, infrastructure, forest ecology and public health. In water, it affects the growth and health of fish and other aquatic life by reducing pH of the water. Acid rains also impacts soil structure that subsequently impacts the growth of plants. In infrastructure, acid rain can corrode metal structures and erode cement, limestone and marble buildings. Acid rain damages trees at high elevation, and forest damaged from acid rain contains fewer environmental niches for wildlife. While the impact for human comes from the pollutants that cause acid rain, SO<sub>x</sub> and NO<sub>x</sub>, if inhaled it might impact heart and lung conditions.

### Management

**Operational Controls** Emissions to air are managed through selection of equipment, standard operating procedures, preventive maintenance and air emission monitoring. The equipment selection is done by setting up specification for equipment needed before procurement and purchasing process. While the Standard Operating Procedure is developed to ensure the monitoring process are well implemented. Preventive maintenance of equipment is managed through the Maximo system to

ensure equipment is working properly. To reduce the NO<sub>x</sub> emission from operational LNG Plant, Tangguh LNG also operates Low NOX Burners.

Monitoring is conducted to ensure emissions and ambient air parameters are within applicable standard, indicating that operational activities will have no significant impact to the ambient air within the site. Tangguh LNG has also installed online Continuous Emission Monitoring (CEM) equipment on four major stacks. Some adjustments are currently in process to calibrate the results. Fugitive air emission monitoring was carried out using infrared camera. The results so far found only a few minor leaks. Any leak will be followed up for maintenance.

Tangguh LNG has conducted efforts to reduce flaring and CO<sub>2</sub> emissions in 2010 - 2011, among others by controlling sources, and these efforts will be continued in 2012 onwards. A continuous improvement (CI) program was initiated following the CI process starting from the identification of problems, root cause analysis, proposition for improvements, planning and execution, as well as validation of results and lessons learned. The program focused on actions that would give higher impact, such as rigorous management of plant trip/shutdown, increase Boil Off Gas (BOG) availability, add Vapour Recovery Line and adjust Flow Control Valves to balance excess gas. Production Efficiency Improvement (PEI) program is also in place to improve plant performance by weekly review of plant risks and mitigations.

**Objectives and Targets** BP aims to track and control air pollution from its activities to comply with Tangguh Integrated AMDAL and relevant Indonesian regulation.

**Reporting** Ambient air quality and emission monitoring results are reported to relevant government institution on a regular basis. Emission sources inventory is conducted and reported annually, while continuous air emissions result is reported on a 3-monthly basis. Other reports are usually done on a 6-monthly basis.

Air quality monitoring result are also reported annually to the BP Group using Environmental Performance report. The reported parameters for emissions to air are SO<sub>x</sub> as the sum of sulphur dioxide and trioxide, expressed as SO<sub>2</sub> and NO<sub>x</sub> as the sum of nitric oxide (NO) and nitrogen dioxide (NO<sub>2</sub>), expressed as nitrogen dioxide (NO<sub>2</sub>).

## Performance

Emissions to air and GHG performance are reported to relevant government institutions and to BP group annually. Tangguh emissions to air and GHG performance can be reviewed below in Table 1. During 2011, Tangguh managed to significantly reduce flaring from the annual forecast of 17,8 bcf to the actual flaring of 9 bcf due to rigorous management and monitoring.

**Table 1: Emissions to Air from Tangguh LNG**

Parameter	2011 (tones)
Oxides of sulphur (SO <sub>x</sub> )	0
Oxides of nitrogen (NO <sub>x</sub> )	4512.50
NMHC	1208.06
CO <sub>2</sub> emission	4,513
Methane emission	51

### Future Plans

Tangguh LNG will continue to look for ways to better manage and monitor emissions, with emphasis in 2012 to improve equipment maintenance program.

Flaring reduction program will be continued in 2012. Further program will be implemented based on the result of the energy efficiency study that have been conducted in the fourth quarter of 2011.

## Spill Response



### Impact

The Tangguh LNG area is located within a biologically diverse and ecologically sensitive environment. Of particular ecological importance is the mangrove swamp, which form a fringe around the shore of the Berau-Bintuni Bays, and occupy much of the large estuarine mosaic at the head of Bintuni Bay. Bintuni Bay is home to some species of marine mammals including Sousa and Spinner Dolphins, which are considered protected species. The bay is also important as a fishery area for the local community. If not responded properly, spills in the on shore facilities will have the potential to impact soil, groundwater and surface water, and depending on the location and volume of the spill, may enter and impact the bay water and shoreline ecosystem. Offshore spill will have potential impacts to the bay water quality, fish, marine biota including marine mammals and mangrove area.

### Management

Specific emergency response procedure - Oil Spill Contingency Plan (OSCP) is in place and reviewed annually. Spill less than 15 barrels is recorded and reported every 6 months to related government institutions, while spill more than 15 barrels shall be reported immediately and written report submitted within 2 x 24 hours to government. Detail investigation is completed following each spill, including analysis of the root cause of the spill and actions to prevent future recurrences.

### Offshore

Potential sources of spill are marine collision, condensate loading at combo dock, fuel offloading, vessel refueling at combo dock and loss of well control. Marine response facilities are equipped with oil boom, oil skimmer, absorbent pad, and dispersant as part of emergency response preparedness. 12 members of Incident Management team have participated in IMO Level 2 and 3 training. IMO Level 1 trainings for the spill responder team have been conducted in August 2009 (40 participants), December 2009 (25 participants) and March 2010 (24 participants). Further IMO Level 1 training is planned to be conducted again in 2012.

Tangguh LNG is actively taking part in sea spill response preparedness review with other PSCs (Production Sharing Contractors), coordinated by BPMIGAS. BPMIGAS divided PSCs in 8 areas, and BP is the coordinator for Area 8 (Papua and Maluku).

To support spill and response preparedness assessment, fate and trajectory oil spill modeling has been completed and the results is utilized to develop the spill response plan and determine the key spill response equipment required to be provided at Tangguh. Tangguh LNG oil spill modeling integrates Three-Dimensional Ocean Hydrodynamic Model, Oil Spill Model, and Geographic Information System (GIS) in Microsoft Windows System. The ability of the model to calculate the probabilities of impact to an area and to track the source of a spill will help Tangguh LNG to establish Oil Spill Risk Map in its Contingency Plan.

## Onshore

Potential of sources of spill are transportation of fuel/chemicals, fuel refuelling, and loss of containment. The management of fuel and chemical used and stored onsite is in compliance with Tangguh Integrated AMDAL and the Indonesian regulations. Procedures are in place to immediately handle onshore spills.

Regular spill drill and training are performed to ensure the readiness of the response team in handling oil/chemical spills. There were total 24 drills/trainings conducted in 2011. Regular inspection and socialization are conducted on storage areas, with particular focus on storage for chemicals and hydrocarbon. Drip pan trays are used during maintenance and refueling, and personnel involved in these activities are properly trained. Posters are strategically placed to maintain awareness on proper refueling and maintenance procedures. Oil/chemical spill kits are provided in strategic places for immediate response in case of spill. Waste from the spill, including contaminated soil/gravel is treated as hazardous waste to be disposed to an offsite hazardous waste treatment facility.

Detailed inspections were conducted to assess the conditions of all storage tanks within the site, and recommendations for improvement are provided when necessary and the actions closure is followed up, including physical construction of additional secondary containment for some tanks. Secondary containment for each hydrocarbon and chemical storage tanks are established, pending one hypochlorite tank that will be completed in mid-2012 as per schedule.

### Objectives and Targets

A management program to prevent and reduce spills in 2011 was developed in each operating area which identifies actions to be completed to reduce the number of spills.

### Operational Controls

Spill prevention controls are in place including procedure and secondary containment for both operations and projects activities. Specific working instructions for the project are developed to provide clear requirements for spill prevention. Environmental Management Programs are developed in each operating area that identify actions to be completed to assist in meeting the site target (where present) to prevent spill and improve capability of spill supporting facilities.

## Performance

During 2011 period, there were 21 minor spills with aggregate volume of about 15 barrels from the primary containment although a proportion of this volume was recovered. Immediate actions were taken to respond to each spill and investigations were conducted to identify root cause and prevent future recurrence.

### Future Plans

For onshore area, improvement of fuel and chemical storage areas has been completed in 2011, with remaining one storage for hypochlorite tank to be completed in mid 2012 as per schedule. We continue to implement rigorous management especially for new projects activity in 2012, i.e. Sanitary Landfill Project, Mechanical Electrical Stinkul Project, Tank Cleaning Project, and Dredging Work.

For offshore area, some improvements are still required to improve offshore spill response in particular related to marine support vessel, to provide spill response equipment storage closer to the jetty to reduce response time, continue IMO Level 2 and 3 training program for site team and to conduct IMO Level 1 training (wet drill) on site. These actions are underway and expect to be completed by 2012.

## Solid Waste and Hazardous Waste



### Impact

Tangguh LNG operations generate non-hazardous waste and hazardous waste. Non hazardous waste can be classified as organic waste, combustible waste, reusable waste, recyclable waste and inert waste.

Hazardous waste, including used oil, used oil filters, paint cans, spent catalyst, contaminated soil, etc generated from Tangguh LNG operations activities are temporarily stored in a permitted temporary hazardous waste storage at site prior to the shipment to a licensed hazardous waste treatment facility in West Java, Indonesia.

If not managed properly, this waste may create potential impact such as leakage and contamination to soil and ground water. In addition, improper management of food waste and inert waste disposed in landfills has the potential to become the habitat for disease vector animals.

### Management

Solid waste management should refer to Tangguh Integrated AMDAL and applicable Indonesian regulations. Tangguh LNG applied the Reduce, Reuse, and Recycle principle for non-hazardous solid waste management. Waste generated from Tangguh LNG Operations (industrial and domestic) is separated into four classifications, i.e. food waste, recyclable, combustible, and hazardous waste. Waste bins are labeled and color coded according to the waste classification: **blue** for food waste, **yellow** for recyclable, **green** for combustible waste, and **red** for hazardous waste.

**Operational Controls** The waste management facility at Tangguh include the non-hazardous waste incinerator, wood chipper machine, composter, plastic shredder, temporary hazardous waste storage, and can compactor, as well as the operation of ex-LNG construction project phase inert landfill and organic waste landfill.

Procedures for non-hazardous waste management and hazardous waste management have been developed and implemented. Detail requirements on waste management captured in work instruction. Maintenance for waste facilities is done regularly. Training is given to the waste facilities operators.

**Objectives and Targets** There were several objectives and targets for waste management in Tangguh LNG operations in 2011, such as manage disposal of hazardous and non hazardous waste and waste management optimization in order to reduce organic waste disposed in organic landfill.

### Performance

Tangguh LNG improved control for expired chemical disposal. Chemicals shall be completed with MSDS and shall be disposed of once expired. In addition, there were training related with waste management including hazardous waste and non-hazardous waste attended by 946 personnel during 2008-2011.

**Table 2: Tangguh Solid Waste in 2011**

Waste	Total Waste in 2011
<b>Non. Hazardous Waste</b>	
Incinerated Waste	6134.15 m <sup>3</sup>
Mixed Wood Waste	1372.80 m <sup>3</sup>
Metal Scrap	0.00 m <sup>3</sup>
Saw Dust Waste	1007.60 m <sup>3</sup>
Food Waste	1618.98 m <sup>3</sup>
Grease Trap Waste	359.00 m <sup>3</sup>
Inert Waste	903.12 m <sup>3</sup>
Used Can	78.11 m <sup>3</sup>
Used Plastic Bottle	957.20 m <sup>3</sup>
Used Glass Bottle	54.81 m <sup>3</sup>
<b>Hazardous Waste</b>	1837.466 ton

### Future Plans

Waste management will continued to be maintained properly in 2012. Improvement in waste management will focus in waste management optimization. Proper placement of waste bins, labeling and symbol and waste management area will be improved. There will be efforts to reduce organic waste volume to be disposed in organic landfill such as food waste dryer procurement. Hazardous waste disposal will remain an objective in 2012. Hazardous waste handling procedure will be socialized further to contractors. The implementation of existing waste management system such as segregation for non hazardous waste, waste management campaign, and training will continue.



## Wastewater



### Impact

Wastewater generated from Tangguh LNG activities consists of sewage from camps and dormitories, brine water reject from the desalination units, and waste water from plant operation (chemically contaminated water, oily water, and produced water).

In line with Tangguh Integrated AMDAL and wastewater discharge permit, wastewater shall be treated in each wastewater treatment facility prior to disposal in -13 m LAT discharge point. Regular monitoring is conducted at specific compliance point to ensure discharge quality. If not managed properly, waste water discharge may impact the receiving environment.

### Management

Wastewater management shall refer to Tangguh Integrated AMDAL, applicable Indonesian regulations, permits, Tangguh Lenders Group Requirements, and BP Group Practices. A segregated drainage system is provided for Tangguh LNG in order to separate the wastewater into non-contaminated and potentially contaminated area.

During the early start-up period in 2009, hydrocarbon and emulsions in the produced water were found at a higher hydrocarbon concentration than the AMDAL and permitting requirements. Phenol and COD concentrations were also found higher than the estimation during design phase. The initial design did not include equipment to treat phenol and COD to be in line with discharge requirements. A temporary treatment unit has been installed at site since mid 2009 and generally was able to manage the wastewater to meet the required standard prior to discharge. The treatment consists of a temporary filtration unit (clay and activated carbon) and aeration pit, continued by biological treatment. Tangguh obtained approval from the Ministry of Environment to use load-based standard for the parameter COD, phenol, and NH<sub>3</sub>-N while the new Produced Water Treatment (PWT) is being constructed. By December 2011, the new PWT has been constructed and started operation. Since then, the temporary treatment plant was not in use.

**Operational Controls** Procedures for wastewater management at Tangguh LNG are in place and implementation is being monitored rigorously to ensure all wastewater parameters are in compliance with the regulation. Wastewater treatment facilities include sewage treatment plant (STP), Corrugated Plate Interceptor (CPI), Neutralization pit, temporary produced water treatment and new produced water treatment facilities.

Tangguh LNG conducts routine monitoring by both external accredited laboratory and internal laboratory. This monitoring includes all necessary parameters for wastewater from all stream based on the AMDAL, permit and Government regulation.

**Objectives and Targets** Our goal for improvement in wastewater management is to ensure all parameters comply with the regulation.

### Performance

Performance trend on wastewater debit is listed in the table below:

**Table 3: Performance trends on waste water debit**

Wastewater	Maximum Debit	Actual Debit Average in 2011
	(m <sup>3</sup> /day)	(m <sup>3</sup> /day)
Sewage – Utility	504*	112.23
Brine Water – Desal Unit	11544*	948.31
Produced Water	1992*	1060.88
Oily Contaminated Water	2400*	0.00
Chemically Contaminated Water	3600*	1062.08
Sewage – Step 3 Camp	2000**	671.54
Brine Water – RO Unit	5904**	2029.51

\* MoE Wastewater Discharge Permit No. 222/2008

\*\* MoE Wastewater Discharge Permit No. 562/2007

\*\*\* CPI effluent is routed to produced water system due to COD content, so there is no discharge for oily contaminated water

### Future Plans

Performance of the wastewater management will be monitored on a regular basis to assure its compliance with applicable standards. Any deficiency shall be followed up immediately.

## Glossary

AGI	Acid Gas Incinerator
AMDAL	Analisis Mengenai Dampak Lingkungan (Environmental and Social Impact Assessment )
AsPac	Asia Pacific
BOG	Boil off Gas
BPMIGAS	Badan Pelaksana Kegiatan Usaha Hulu Minyak dan Gas Bumi (Upstream Oil and Gas Executive Agency)
CEM	Continuous Emission Monitoring
CI	Continuous Improvement
CO2	Carbon Dioxide
COD	Chemical Oxygen Demand
CPI	Corrugated Plate Interceptor
CTM	Compliance Task Manager
DOCUMENTUM	Tangguh LNG web-based document system
E&P	Exploration and Production
EMP	Environmental Management Program
EMS	Environmental Management System
GDP	Group Defined Practice
GHG	Greenhouse Gas
GIS	Geographic Information System
HSE	Health, Safety and Environment
HSSE	Health, Safety, Security and Environment
IMO	International Maritime Organization
ISO	International Organization for Standardization
LAT	Lowest Astronomical Tides
LNG	Liquefied Natural Gas
MeBr	Methyl bromide
MoE	Minister of Environment
MSDS	Material Safety Data Sheet
NMHC	Non Methane Hydrocarbons
NOx	Nitrogen Oxides
ODS	Ozone Depletion Substance
OSCP	Oil Spill Contingency Plan
PSC	Production Sharing Contract
RO	Reverse Osmosis
SME	Subject Matter Expert
SOx	Sulphur Oxides
SPU	Strategic Performance Unit
STP	Sewage Treatment Plant
TAR	Turn Around
VP	Vice President

PT. SUPERINTENDING COMPANY OF INDONESIA



## Environmental Statement Verification

### Sucofindo International Certification Services (SICS) Review of 2011 Tangguh LNG Site Report

#### About Sucofindo

SUCOFINDO PT (Persero) was established on October 22, 1956 as the first inspection company in Indonesia. Our customers consist of national and international private sectors, Government of Indonesia, Government of related countries and international donor agencies. There are currently more than 45 branches in Indonesia which serve survey and superintending activities with nearly 4000 professionals. Sucofindo gained recognition and establish international partnerships with various Institute of Inspection, Certification and International Accreditation Agency.

SUCOFINDO International Certification Services (SUCOFINDO ICS), which was formed in 1994, is one of the Strategic Business Unit that provides specialize services in certification of ISO 9001, ISO 14001, ISO 22000, ISO 27000, ISO 28000, Product Certification, OHSAS 18001, GMP & HACCP, RSPO, Safety audit from Ministry of Man Power, Security Management System, Customer Satisfaction Survey and Training. Lead Auditors and Auditors of SUCOFINDO ICS are trained professionals in the field of international standards, auditing and management systems and are registered in the IRCA (International Register of Certified Auditors) as well as other international and national registration bodies. To assure the quality of certification process, SUCOFINDO ICS has obtained accreditation from National Accreditation Committee (KAN-Indonesia).

#### Scope of Assessment

To verify the 2011 Tangguh LNG Site Report from BP Berau Limited. The scope includes LNG Train 1 and Train 2 as well as all related supporting facilities.

#### Approach of Assessment

Sucofindo International Certification Services (SICS) has conducted the first certification audit of Tangguh LNG Environmental Management System of ISO 14001: 2004 on October 18th - 21st 2010, and has awarded ISO 14001: 2004 certification which is valid from December 01, 2010 until November 30, 2013.

SICS will perform annual surveillance audit. The objective of surveillance audit is to ensure that Tangguh LNG Environmental Management System is effectively implemented and comply with the ISO 14001: 2004 requirements. The verification process uses best practice and considers applicable standards, other requirements and other related documents that are available with organization business process. The process also includes interviews with key person, documents and records checking and observation on site, as well as evaluation of policy, objectives, target and programmed, environmental aspect, legal and other requirement, monitoring and measurement of environmental performance, evaluation of compliance to the regulation and other requirement, emergency response, competency personnel and operational control.

### **Conclusion of Assessment**

The 2011 Tangguh LNG Site Report from BP Berau Ltd. has been verified by SICS using audited samples and data during audit with the conclusions as follows:

- Management level has a strong commitment to ensure that Environmental Management System is consistently implemented and complied with applicable regulations and other relevant requirements.
- All documentation has been determined to comply with the requirement of ISO 2004:2009 standard and well maintained in the online system.
- Socialization of environmental policy and procedure to all person at Tangguh LNG including contractor personnel has been conducted properly.
- List of applicable environmental regulation has provided, and all environmental Statutory and Regulatory were periodically monitored and evaluated as regard to compliance levels and taking necessary corrective and preventive action to address noncompliance if any.
- Environmental aspect and impact have been systematically identified and the operational control, monitoring activities, and/or environmental management program based on the scoring criteria have been established. Personal in charge at every function understand the environmental aspect and impact mechanism and their roles and responsibilities in achieving conformity with the requirements of the environmental management system and the consequences of departure from specified procedures. Organization has been determined objectives and target to control its environmental impact and provide the programmed achievement each year. Corrective and preventive action has been shown to ensure effectiveness of environmental management system within organization.
- Internal EMS audit process and procedures have been established that will help assure that the EMS continues to conform to internal and external requirements. Management Review has been undertaken consistently and the results are used to continually improve the environmental management system implementation.

Sincerely,

**Sucofindo International Certification Services (SICS)**



Herdi Purwanto  
Lead Environmental Auditor

## Feedback

Your feedback is important to us. If you have any comments or queries about this report or general operations, we will welcome for your written inquiry and we will be happy to assist.

### **BP Berau Ltd.**

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