



Tullow Ghana Ltd Accra, Ghana

Independent External Monitoring Group

GHANA Site Visit: May 2018

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ABBREVIATIONS AND ACRONYMS

Aoi	Area of Influence
ALARP	As Low As Reasonably Practicable
AMR	Annual Monitoring Report
AZ	Advisory ZOne
BULT	Business Unit Leadership Team
CCR	Central Control Room
CLO	Community Liaison Officer
DWI	Detailed Work Instructions
EHS	Health Safety Environment
EHSAP	EHS and Asset Protection
EMR	Environmental Monitoring Report
EMP	Environmental Management Plan
E.Mon.P	Environmental Monitoring Plan
ESAP	Environmental and Social Action Plan
ESIA	Environmental And Social Impact Assessment
ESMS	Environmental And Social Management System
EZ	Exclusion Zone
FFDP	Full Field Development Plan
FPSO	Floating Production, Storage and Offloading
GNCFC	Ghana National Canoe Fishermen Council
GNGC	Ghana National Gas Company
Gh EPA	Ghana Environmental Protection Agency
GHG	Greenhouse Gases
GNGC	Ghana National Gas Company
GTG	Gas Turbine Generators
HIPO	High Potential Incidents
HR	Human Resources
IESC	Independent Environmental and Social Consultant
IFC	International Finance Corporation
IMS	Integrated Management System
IOGP	International Association of Oil & Gas Producers
IRIA	Incident Reporting, Investigation and Analysis
ITLOS	International Tribunal of the Law of the Sea
IVB	Independent Verification Body
JEAM	John Evans Atta Mills
KNK	Kwame Nkrumah (FPSO)
LDSP	Livelihood Diversification and Support Project
LTI	Lost Time Injury
LTIF	Lost Time Injury Frequency
MARPOL	Marine Pollution: International Convention for the Prevention of Pollution from Ships
MMO	Marine Mammals Observation
MOC	Management of Change
MSDS	Material Safety Data Sheets
NADF	Non-Aqueous Drilling Fluids
NORM	Naturally Occurring Radioactive Material

OOC	Oil on Cuttings
OIW	Oil in Water
OF	Operations Framework
OIM	Offshore Installation Manager
OMF	Operational Management Framework
OSCP	Oil Spill Contingency Plan
OSCR	Offshore Safety Case Regulation
OWS	Oil Water Separator
PC	Petroleum Commission
PCDP	Public Consultation and Disclosure Plan
PPE	Personal Protective Equipment
PS	Performance Standard
PTW	Permit to Work
KPI	Key Performance Indicator
SCEs/ECEs	Safety and Environmental Critical Elements
SDS	Safety Data Sheet
SEI	Socio-Economic Investment
SP	Social Performance
STEM	Science, Technology, Engineering and Mathematics
TEN	Tweneboa, Enyenra, Ntomme
TGL	Tullow Ghana Limited
TR	Temporary Refuge
TRIF	Total Recordable Injury Frequency
TRP	Turret Remediation Project
WHO	World Health Organisation
WMP	Waste Management Plan

EXECUTIVE SUMMARY

The Jubilee Phases 1, 1A and Tweneboa, Enyenra, Ntomme (TEN) Oil and Gas Development Project (or “the Project”) involves the extraction of hydrocarbons from the two oil fields located offshore Ghana.

The Jubilee oil field lies in deep waters, with depth ranging between 1,100 and 1,700 meters; it is located at approximately 60 km from the shoreline at the western edge of Ghana and covers an area of about 110 Km². The TEN field is located approximately 20 km west of Jubilee field and some 45 km offshore from the Ghana mainland.

The Jubilee Phase 1 consists of drilling and development of 17 oil, gas and reinjection wells connected with a Floating Production, Storage and Offloading (FPSO) Vessel for commercialization of the produced oil.

The Jubilee Phase 1A development project, designed to increase production and recover additional reserves, was approved by the Government of Ghana in January 2012. Phase 1A included the drilling and completion of 8 additional oil production and water injection wells, the tie-in to the existing FPSO unit and the installation of additional subsea equipment for water injection.

On 29 May 2013, the Government of Ghana formally approved the TEN Project and Tullow Ghana Ltd (TGL) commenced with its second major operated deep-water development project in Ghana. Similar to Jubilee, the development includes the use of an FPSO, named FPSO Prof. John Evans Atta Mills (JEAM). The TEN field produced first oil in August 2016 and is now operational.

Within the project disbursement agreement, TGL, the designated Unit Operator, and the International Finance Corporation (IFC) have established a range of Environmental and Social management measures applicable for the Jubilee Phases 1 and 1A Project, which have been included in an Environmental and Social Action Plan (ESAP), developed in compliance with IFC’s Performance Standards and Guidelines. Following TGL request to add TEN assets into the Reserve Based Lending facility to finance its development, the TEN Project is being developed according to the same IFC Performance Standards (2006).

This report provides the findings and observations of the independent environmental and social consultant (IESC) as a result of the external independent monitoring group visit and review carried out in May 2018, relevant to the period of 2018 and up to the time of the site visit.

The IESC site visit included the TGL headquarters in Accra, the KNK FPSO (Jubilee), the onshore TGL shore base in Takoradi, meeting with the National Ghana Canoe Fisherman Council, and a visit to Axim Fishing Community.

At the time of the 2018 independent external verification, all actions foreseen by the ESAP (dated December 2010) have been already implemented by TGL; nonetheless the external independent monitor has conducted a systematic review of all actions included in the ESAP in order to provide a follow up on the current status of their implementation.

Based on the conducted review, no non-compliance situations with respect to the implementation of the ESAP requirements were identified for the period in review. Some observations have been made by the IESC regarding specific ESAP items, however, these are suggestions for improvement and are not deemed to be non-compliances. The following provides an overview of the main IESC findings and suggestions, while additional details can be found in the respective sections of the report.

The IMS system launched in 2015 is now fully operational and sets all the mandatory policies, standards and controls required to ensure TGL activities and associated risks are managed. TGL Business Unit reviewed the local system to be in compliance with the Tullow Group IMS. The results of an independent internal audit will identify if the Corporate function have embedded mandatory requirements across the group and if TGL requirements are in line with Group Requirements.

In general, good management of Project personnel is acknowledged, with no major issues reported in the past year. TGL management, i.e. Business Unit Leadership team (BULT), has significantly changed and in particular, a new TGL Managing Director and TGL EHS and Asset Protection (EHSAP) Manager have been appointed. These offices continue to be supported by the Environment Team Lead, the Asset Protection Team Lead, and the Health and Safety Team Leads. The EHSAP structure remains adequate for the current activities. The position of the SP Manger has remained stable since 2015 while some changes occurred in the composition of the SP team. Two CLOs, out of the six formerly part of TGL SP team, have left and their positions are currently vacant. Due to the latest changes in TGL personnel, IESC suggests organizing an additional training session in IFC PSs (2012 version). TGL working relationship with the CLOs is currently a challenge. For several years they have been reporting general discontent related to their salary, increased workload, inadequate tools and limited transportation allowances. Even if some improvements in their labour conditions have been reported, TGL should seek an acceptable long-term solution to these problems as acknowledgment of the important role they play. This aspect is

particularly important now that the demand for positions with similar experience and background from other O&G companies is increasing.

Extensive Environmental, Health and Safety (EHS) training continued in 2017 covering a wide range of topics, including oil spill management and response (IMO level III), project-management, essentials of Oil and Gas (O&G) for non-technical personnel, and specific training required across different working environments.

Environmental monitoring actions continue to be carried out by the Project. For the 2017 reporting period, the previously established EMPs remained in place and the monitoring requirements are still undertaken according to the TGL Monitoring Plan. Some of the TGL EMPs have not been reviewed within the nominated time frame (annually, or every 2 years depending on the document). The Environmental Management Plan, which is the main document providing guidance on the environmental management framework for both Jubilee and TEN, has been recently updated and will remain valid in its current revision for the next three years, until March 2020. The Environmental Monitoring Plan and the Waste Management Plan, expected to be updated, are still currently under review. In any case the main environmental plans that are subsidiary to the EMP have been modified and implemented to include management and monitoring requirements also for the TEN project.

TGL ongoing activities on the FPSO's production and operations logistical support, including the chemical facilities, are still covered by the permit released on May 25th, 2015 with a validity of 3 years, successively the permit will be renewed.

Flaring for both FPSOs in 2017 exceeded Gh EPA limits for a number of months,, attributed to numerous process upsets and maintenance activities onboard the KNK FPSO, and the commissioning activities onboard the TEN FPSO. All flaring events associated with planned maintenance activities were anticipated and accordingly approved by Gh EPA. In December 2017 TGL developed the Flare and Vent Management Plan, which outlines the situations where venting and flaring occur, and the preferred management options available to TGL. Flaring remains a constant aspect of the Project and although the IESC understands that production flaring, while not specifically permitted by the Gh EPA permit, will remain a continuous Project necessity. Additional details have been requested by the IESC as the flaring exceedance situation over recent years appears to be almost routine and not an exception. The IESC would appreciate receiving additional Project data to determine what is routine, non-routine and whether mitigation/avoidance measures are available to the Project.

The IESC has been provided with environmental monitoring records for the period under review and notes that emission monitoring and record keeping is up to date. Waste management and housekeeping was observed to be good across all sites visited and the management approach found to be proactive.

Overall, during the site visit, the monitoring team continued to observe a sound Health and Safety (HS) culture across all levels of TGL's Organization, which is reflected in the health and safety findings of this report. TGL's strong commitment and awareness towards safety is evident at all visited Project facilities both onshore and offshore.

HS Management Systems enforced on both FPSOs are considered adequate, effectively implemented and maintained to control and manage any unexpected hazardous scenario that could pose a threat to the health of the people or the integrity of the assets, as well as major oil spills that could result in severe environmental damage.

During the reporting period, TGL provided evidence of the efforts made to consistently develop and implement its Integrated Management System (IMS) at all organization levels. The successful delivery of improvement plans for Process Safety, as well as for contractors to improve their HS performances after the recording of LTIs, the constant update and integration of relevant safety management documents (such as the KNK and JEAM FPSO Operational Safety Case) and regular auditing and training activities are good examples of the system's integration.

The management of process safety is considered adequate and the risk level associated to major hazards is As Low As Reasonably Practicable (ALARP) as reported into the respective FPSO Operations Safety Cases. Moreover, to monitor, evaluate and manage process safety risks on the FPSOs, a software package called RiskPoynt, based on the Swiss Cheese Model, allows TGL to assess the level of risk by providing in real-time the impairment status (i.e. effectiveness/availability of the barrier in case of incident) of the safety barriers. During the reporting period, this system has been successfully introduced and rolled out for both Jubilee and TEN projects.

To ensure a comprehensive and cost-effective Asset Integrity Management System, TGL continues to adopt, for both FPSOs, a Computerized Maintenance Management System (CMMS - MAXIMO) allowing the maintenance/inspection team to effectively track the tasks to be carried out, keep records and plan future activities. The CMMS, rolled out for both FPSOs in 2016, allowed TGL to attain specific Process Safety KPIs (such as Safety Critical Maintenance Plan) in 2017, therefore assuring inspection and maintenance activities of all the identified SCEs/ECEs.

The Turret Remediation Project (TRP) on the KNK FPSO continued in 2017 with the FPSO Interim Mooring project completed in March 2017, which in turn allowed the release of the Anchor Handling vessels. Currently the project is undertaking a Bearing Stabilisation program, which will include the lifting of the Turret in order to fix the damaged bearings and enable the FPSO heading to be changed for a permanent spread mooring system to be installed, foreseen in March 2019.

Regarding social aspects, TGL SP strategy in 2017 was focused on the following key areas of intervention: socio-economic activities, which fall under the - Socio-economic Investment (SEI) Strategy, impact (fisheries) management and stakeholder engagement. The reference documents for TGL social activities have not undergone changes, but considering the past modifications to the SP strategy, IESC recommends updating at least the Public Consultation and Disclosure Plan (PCDP). SP Project beneficiaries remained mainly the fishing communities of the six coastal districts of the Western Region. Among the impact management projects, TGL continues to finance the Livelihood Diversification and Support Project (LDSP), aimed at providing fishermen affected by the general decline of fish catch and Project impacts with alternate sources of income.

Fishermen Sea Access remains a pillar of TGL SP strategy. TGL is focused on ensuring safety and deterring incursions into the Exclusion Zone (EZ) and Advisory Zone (AZ) through a new prevention strategy, which led to the decrease of EZ incursions (but not in the AZ). TGL refers to the Government for the identification of alternative solutions to face the problem of fishermen encroachment, which now needs to be tackled at industry level. In 2017 the JV Partners commissioned the development of a "Sea Access Framework" to improve the management of sea access. The process has been handed over to the Petroleum Commission (PC) and the report is expected to be issued by the end of May 2018.

Regarding stakeholder engagement, the IESC notes that community engagement continues to be of a good standard. In 2017 considerable effort was made to engage with deep-sea fishermen and the canoe council executives to continue to educate them on the FPSOs EZ and AZ and on the seismic campaigns. TGL became aware of the need to invest more effort to engage also with canoe owners, as they are generally different from the fishermen (often women) and thus are less sensitive to fishing restrictions (in particular with reference to AZ and EZ). The main step undertaken to allow their engagement was their identification through a data collection and validation exercise, led and implemented by the Fisheries Commission, and expected to be completed by the end of 2018. The information collected will be essential also to facilitate and shorten the process of grievance resolution, whose duration exceeds the timeline defined by the grievance process (up to 8-9 months). Beyond the delays caused by the need to involve several stakeholders to assist with investigation and follow-ups (including chief Fisherman/Landing beach Committee and Canoe Council/Fisheries Commission), long timeframes are also reported due to the TGL internal resolution process (which requires the involvement of a number of different TGL departments). TGL should do everything in its power to shorten the duration of the grievance resolution process (in particular by pushing all the departments involved), in order to reduce the impacts on the livelihood of fishermen, who reportedly cannot work until the damaged equipment is reimbursed and replaced.

Finally, IESC note that the TGL website is still not used sufficiently by the Company to disclose Project information on social management. IESC reiterates its suggestion to consider the disclosure on the TGL website of the PCDP, TEN NTS, main Project milestones in the field of community engagement in order to reach other possibly interested stakeholders and give more visibility to TGL efforts. IESC suggests also disclosing on the Company website the outcomes of the community ambient air quality study undertaken in 2017, which confirmed that the ambient air quality of the coastal districts is not being impacted by offshore flaring.

1 INTRODUCTION

1.1 JUBILEE AND TEN

The Jubilee Phases 1, 1A and Tweneboa, Enyenra, Ntomme (TEN) Oil and Gas Development Project (or “the Project”) involves the extraction of hydrocarbons from the two oil fields located offshore Ghana.

The Jubilee oil field lies in deep waters, with depth ranging between 1,100 and 1,700 meters; it is located at approximately 60 km from the shoreline at the western edge of Ghana and covers an area of about 110 Km². The TEN field is located approximately 20 km west of Jubilee field and some 45 km offshore from the Ghana mainland.

Tullow Ghana Limited (TGL) has been designated as the Unit Operator under the Unitization and Unit Operator Agreement signed with the Ghanaian Ministry of Energy.

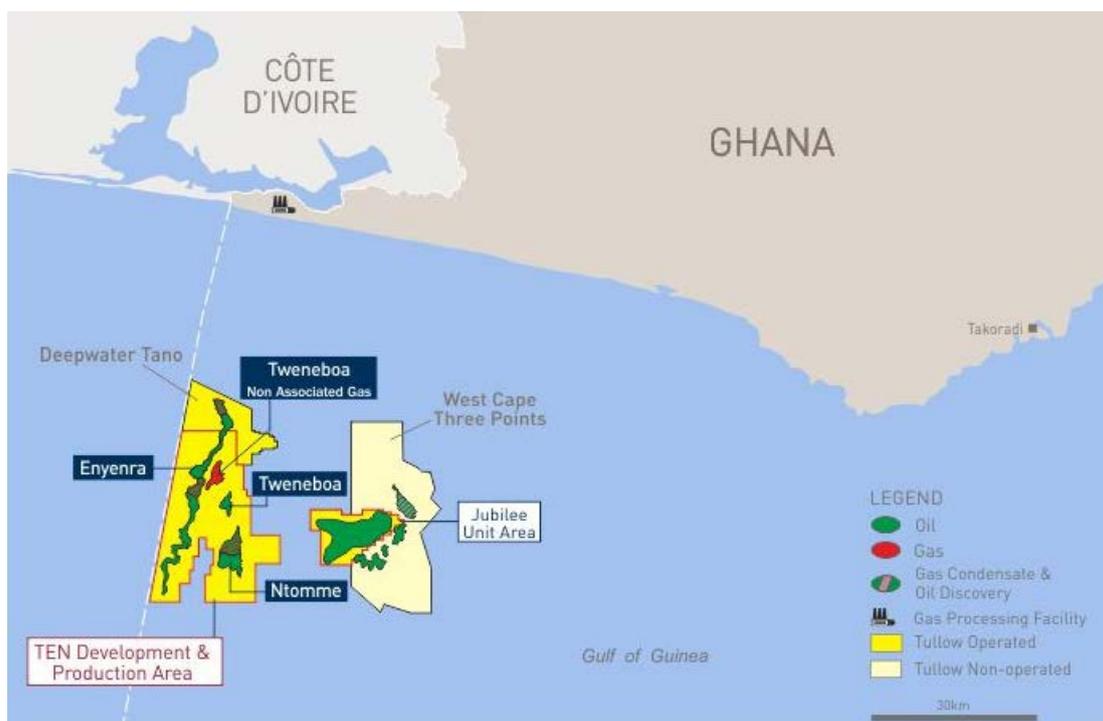


Figure 1.1: Location of the Jubilee and TEN Oil Fields

The Jubilee Phase 1 Project included the development of a total of 17 wells, construction and operation of the pipeline underwater network to collect the oil and gas to the Floating Production, Storage and Offloading (FPSO) Vessel, operation of the Kwame Nkrumah (KNK) FPSO and related supporting vessels and operation of the onshore facilities (Tullow Logistic Shore Base, the adjacent pipe yard and chemicals storage area and the Takoradi port facilities). All the related drilling activities were concluded in 2011 with the completion of the last oil production well.

The Jubilee Phase 1A development project, designed to increase production and recover additional reserves, was approved by the Government of Ghana in January 2012. Phase 1A included the drilling and completion of 8 additional oil production and water injection wells, the tie-in to the existing FPSO unit and the installation of additional subsea equipment for water injection. The Jubilee Phase 1A development plan ("Phase 1A Addendum") was subject to the condition that a Full Field Development Plan (FFDP) would be submitted to the Minister for Energy by 31 December 2012. The FFDP was submitted on 19th December 2012 but was rejected as it did not take into account resources outside of the Jubilee field (the West Cape Three Points area). As such, the Greater Jubilee Full Field Development was developed and submitted (which included the included Akasa, Mahogany & Teak reservoirs) for approval. During this period, the 1A application remained in place with TGL drilling activities undertaken falling under the 1A approval.

On 29 May 2013, the Government of Ghana formally approved the TEN Project and TGL commenced with its second major operated deep water development project in Ghana. Similar to Jubilee, the development includes

the use of an FPSO, with a production capacity of 80,000 barrel oil per day (bopd), tied in to subsea infrastructure across the field. The vessel was converted in Singapore and in September 2015 was officially named FPSO Prof. John Evans Atta Mills (JEAM) after the late Ghanaian president who oversaw First Oil from Ghana's Jubilee Field in 2010. First oil was achieved on time and on budget in August 2016, three years after the Plan of Development was approved by the Government of Ghana. Following first oil, the oil production, gas compression/injection and water injection systems were commissioned and are now operational. In January 2017, the capacity of the FPSO was successfully tested at an average rate of over 80,000 bopd during a 24 hour flow test.

In 2017 KNK FPSO continued with oil and gas production and export to the Ghana National Gas Company (GNGC), with a total export volume of 30,980 mmscf. Total gas export from TEN amounted to 296 mmscf. Gas export from TEN is currently now available as a substitute to ensure the sustained supply of natural gas to the GNGC plant and subsequently to VRA Aboadze Thermal Plant for power generation. Total gas export from Jubilee and TEN for 2017 therefore amounted to 31, 276 mmscf.

TGL and the International Finance Corporation (IFC) have agreed a range of Environmental and Social management measures applicable for the Jubilee Phases 1 and 1A Project, which have been included in an Environmental and Social Action Plan (ESAP), developed in compliance with IFC's Performance Standards and Guidelines. Prior to 2015, Jubilee was the only applicable project subject to IFC Performance Standards, nevertheless when TGL decided to develop the TEN project, it requested approval from IFC (and the involved lenders) in order to add TEN assets into the Reserve Based Lending facility to finance its development. Therefore, the TEN project has been developed according to the same IFC Performance Standards (2006) and TGL is required to deliver an Annual Monitoring Report (AMR), which includes reporting of TEN activities. TGL environmental and social monitoring performances are required to be verified on an annual basis by an external independent monitoring group. RINA Consulting S.p.A. as the Independent Environmental and Social Consultant (IESC) has been appointed by TGL to carry out the annual external independent monitoring of the implementation of the ESAP and related management measures for both Jubilee and TEN projects.

1.2 MARITIME BOUNDARY UPDATE

Ghana and the Côte d'Ivoire have been locked in maritime boundary disputes over the last few years, which impacted the TEN Project and the field's precise location in respect of its western border which exactly lied on the disputed maritime boundary between Ghana and Cote d'Ivoire.

In April 2015, the Special Chamber of the International Tribunal of the Law of the Sea (ITLOS) in Hamburg rejected Côte d'Ivoire's request that Ghana be ordered to suspend all oil exploration and exploitation in the disputed zone, which as stated by Côte d'Ivoire, is the western part of TEN field that supposedly falls into Côte d'Ivoire's territorial waters. ITLOS ordered a number of provisional measures which both Ghana and Côte d'Ivoire were required to comply with; these include continued cooperation and 'no new drilling' until ITLOS gives its decision on the maritime boundary dispute. ITLOS decision was made in September 2017 in favour of Ghana: the tribunal has found that Ghana did not violate the sovereign rights of Ivory Coast by conducting O&G activities in the disputed area. The new maritime boundary as determined by the tribunal does not affect the TEN fields and this allowed TLG to resume drilling.

1.3 REPORT ORGANIZATION

This document is organized as follows:

- ✓ section 1: provides a general introduction to the Project;
- ✓ section 2: presents the IESC scope of the work and adopted approach to conduct the independent external verification;
- ✓ section 3: outlines the agenda of the site visit, along with the list of documents collected and reviewed;
- ✓ section 4: provides the outcomes of the review of the ESAP commitments; and
- ✓ section 5: presents the team findings and observations from the site visit, and the outcomes of the review of the monitoring data collected in agreement with monitoring plans in place for the Project.

2 INDEPENDENT VERIFICATION SCOPE OF THE WORK AND ADOPTED METHODOLOGY

The scope of the external independent verification, as defined by the relevant Terms of Reference issued by TGL on March 9th, 2017 to include the TEN project is to:

1. identify instances where commitments or actions from ESAP have not been implemented (defined as “non-compliances” for the Project) or provide evidence of the implementation of each ESAP related component;
2. review and verify the environmental and social monitoring data collected for the Jubilee and TEN Project and reported within: the AMR issued to IFC, the statutory reports to the Ghana Environmental Protection Agency (Gh EPA), the TGL Corporate reporting requirements and social and community engagement and complaints management;
3. review and verify the effective implementation of HS management system requirements for the safe management of all operations and potential occupational hazards, and the prevention and mitigation of loss of containment and, specifically, of any oil spill scenarios; and
4. conduct a visit of selected Project facilities and interview TGL personnel in order to evaluate the implementation of ESAP related monitoring requirements.

In order to carry out the above scope of the work, IESC has involved a multidisciplinary team including one Environmental, one Health & Safety and one Social expert, with extensive experience in the Oil and Gas Sector.

The adopted methodology has included:

- ✓ the desk review of the ESAP and related implementation plans to understand Project commitments;
- ✓ the desk review of the latest issued 2017 AMR report (dated March 2018);
- ✓ the systematic spot check of the raw monitoring data, by collecting and reviewing, for each environmental and social component, the Project records and reports (including a sample of statutory reports to the Gh EPA and Gh EPA environmental audits undertaken in 2017);
- ✓ the evaluation of project performances through the visit of main operating facilities and the interview of TGL Environmental, Health and Safety (EHS) personnel;
- ✓ the evaluation of project social related components by conducting joint meetings with coastal communities and TGL representatives;
- ✓ the identification of gaps with respect to the ESAP commitments (non-compliances), or the verification of their implementation; and
- ✓ the identification of possible areas of improvement for the implementation of the ESAP commitments and related environmental and social monitoring requirements.

3 SITE VISIT DESCRIPTION

The site visit of the independent external monitoring group has been organized in order to reflect the different fields of expertise of the team members (biophysical environment, health & safety, social) and to cover as much as possible all Project related facilities and stakeholders.

The following provides an outline of the site visit conducted along with the scope of each visit or activity carried out. Each visit or activity has been carried out jointly with the TGL EHS and Social Performance (SP) teams:

- ✓ kick-off meeting in Accra at TGL Headquarter (held on 8th May) with TGL and MODEC staff. Interviews with Project staff;
- ✓ brief introductory meeting with Takoradi Leadership (9th May);
- ✓ visit to KNK FPSO (9th and 10th May) with the main purpose to verify TGL EHS Management System requirements and their implementation. The visit included a kick-off meeting, followed by a walkthrough of the key topside facilities of the FPSO, meetings with TGL/MODEC personnel (FPSO OIM, FPSO Operations Team Lead, FPSO Superintendent, FPSO Safety Specialist, etc.), verification of correct implementation of EHS procedures and concluded with an informal close-out meeting, during which the IESC presented the main findings of the visit to the FPSO top management;
- ✓ meetings in the TGL Takoradi Office with the SP team (9th and 10th May) and one Community Liaison Officer (CLO) to receive an update of the main progress and changes in implementing activities with local communities through social engagement and investments;
- ✓ visit to Axim Fishing Community to meet the Chief of Lower Axim Traditional Area, Axim Fishermen Chief and the canoe owners involved in the Grievance Redress Process. Discussion with two CLOs (9th May);
- ✓ meeting with Executives of the Ghana National Canoe Fishermen Council (GNCFC) (10th May);
- ✓ visit to the TGL shore base, Pipeyard and Warehouse facilities to observe the implementation of EHS aspects on site, and discussions with Project staff (10th May); and
- ✓ ESHS wrap up meeting with Takoradi Leadership (10th May);
- ✓ final interviews in Accra (11th May) with TGL and MODEC staff and additional documentation request/review; close out meeting with TGL Management to present initial monitoring team findings and discuss any remaining queries.

Data collected and reviewed, relevant to the period under review included the following main documents:

1. Annual Monitoring Report 2017;
2. Grievance Report for 2017;
3. Presentation on TGL approach in addressing canoe accidents;
4. Jubilee Operations Safety Case;
5. TGL/MODEC Permit to Work;
6. TGL EMEX Incident Investigation Reports (ref. 4008, 4087);
7. KNK FPSO 2017 Training Matrix;
8. TGL LTIF and TRIF Summary 2017;
9. Environmental Management Plan Jubilee and TEN Development Rev.6 reviewed in March 2018;
10. Environmental Monitoring Plan issued in August 2015;
11. TGL Waste Management Plan Rev.4 reviewed in July 2015;
12. Flare and Vent Management Plan Rev A December 2017;
13. Jubilee and TEN Field Environmental Monitoring FPSO Operations – Monthly Environmental Reports (2017);
14. KNK FPSO Stack Emission Report May 2017.

4 REVIEW OF ENVIRONMENTAL AND SOCIAL ACTION PLAN COMMITMENTS

The Jubilee and TEN ESAP represents the key reference document established within the loan agreement between IFC and TGL and defines the environmental and social management measures in place for the Project.

The document was last revised on 9th April 2014, and outlines the related actions to be implemented, the completion indicator for each Performance Standard (PS) applicable to the Project, and the timetable for completion in a tabular format. At the time of the present independent external verification, all actions foreseen by the ESAP have been implemented by TGL. However, as part of the scope of the work, the IESC has conducted a systematic review of all actions included in the ESAP in order to provide a follow up on the current status of their implementation.

The relevant observations collected by the independent external monitoring team are reported, using the same table format in place for the existing ESAP, in the “May 2018 Status” column. Previous years tracking columns of ESAP items (IESC year on year status and feedback from 2011 to 2017) has been removed from the ESAP table for ease of readability. The “May 2018 Status” column outlines the IESC feedback and changes registered during the 2018 visit.

Some of the observations anticipated in the table and relevant to possible improvements for the implementation of the ESAP actions or related plans, along with the detailed description of the monitoring requirements in place, are presented in Section 5 of the present report.

Based on the observations reported in the table below, it is confirmed that **no non-compliance** situations, as defined in Section 4 of the present report, were observed with respect to ESAP commitments, neither for the Jubilee nor the TEN Projects. The IESC did identify some instances where ongoing obligations of TGL were inconsistent with ESAP requirements; however, based on discussions and TGL provision of documentation, these are not deemed to represent non-compliances. Additional suggestions have been incorporated (as underlined text) in the relevant sections of this report to ensure the continued and effective implementation of ESAP items.

ENVIRONMENTAL AND SOCIAL ACTION PLAN Tullow Oil (#27918 and 31483) April 9, 2014				
Item	Action	Completion Indicator	TGL Update/Comments	May 2018 Status IESC
TULLOW OIL PLC				
PS1: Social and Environmental Assessment and Management Systems				
1	Tullow Oil will revise the Risk Management Guidelines and EIA Recommended Practice to ensure that Applicable Projects are assessed and managed according to IFC's Performance Standards.	(a) The Company has submitted draft revised guidelines and practice acceptable to IFC. (b) The Company has provided evidences that any Applicable Project is in compliance with IFC Performance Standards or has shown that the Applicable Project can come into compliance with the Performance Standards within a reasonable time period following the implementation of an action plan to be agreed upon between the Company and IFC.	(a) Completed. (b) Tullow's operation demonstrate compliance with IFC performance standards 1, 2, 3, 4 and 6. Performance standards 5, 7 and 8 are currently not applicable to TGL operations.	No update or further action required
2	Tullow Oil will reconfigure the IMS to ensure that the Head of EHS reviews all Applicable Projects to ensure that they are evaluated and managed according to the IFC Performance Standards.	The Company has submitted a draft reconfigured IMS acceptable to IFC.	Completed.	No update or further action required

ENVIRONMENTAL AND SOCIAL ACTION PLAN Tullow Oil (#27918 and 31483) April 9, 2014				
Item	Action	Completion Indicator	TGL Update/Comments	May 2018 Status IESC
3	Training in the IFC's Performance Standards and the applicable IFC EHS Guidelines will be provided to those involved with the risk management of Applicable Projects.	The Company has provided evidence of training and developed a specific training procedure to be included in the Corporate training plan.	IFC performance standards training completed for key staff 2013/2014. Further training is now required due to organizational changes in particular in the TGL management structure since the last training.	TGL management, the Business Unit Leadership Team (BULT), has recently changed considerably (affecting almost all positions). As such, IESC suggests organising refresher training session in IFC PSs (2012 version).
JUBILEE FIELD DEVELOPMENT PROJECT- PHASE 1				
PS1: Social and Environmental Assessment and Management Systems				
4	The Project will prepare the ESIA for Ghana EPA, incorporating the results of the Environmental Baseline Survey (EBS).	(a) A draft ESIA has been submitted to IFC for review and comments. (b) The final ESIA has been disclosed in Tullow Oil website.	Completed.	No update or further action required
5	The Project will develop and implement a management of change procedure and Tullow Oil will use reasonable endeavours, by exercising its contractual rights pursuant to any relevant Project Agreements, to ensure that the procedure is part of the Project environmental and social management system (ESMS).	(a) Tullow Oil has submitted the procedure acceptable to IFC. (b) The procedure is integrated in the Project environmental and social management system (ESMS).	Completed.	No update reported or further action required. A new Management of Change (MOC) procedure (TGJ-OPS-PRC-12-0001) has been issued in May 2017 to account for the implementation of BEST (Brownfield Engineering System Toolkit). BEST is an online web-based system designed to manage MOC requests but also RCA, TQ, CTO, etc. via dedicated software modules. BEST is now operational for the Jubilee and TEN Project. TGL shall issue a MOC or justification in case a commitment outlined in the EMP is not undertaken. The MOC or the justification shall indicate why the planned activities are not undertaken.

ENVIRONMENTAL AND SOCIAL ACTION PLAN Tullow Oil (#27918 and 31483) April 9, 2014				
Item	Action	Completion Indicator	TGL Update/Comments	May 2018 Status IESC
6	The Project will have an ESMS that periodically reviews the environmental and social aspects of the Project to determine whether the Environmental Management Plan (EMP) needs to be revised.	<p>(a) The Project has developed an ESMS development schedule and submitted it to IFC.</p> <p>(b) The Project has developed the ESMS for the production, drilling and installation phase, acceptable to IFC.</p> <p>(c) The Project has developed the ESMS for production operations, acceptable to IFC.</p>	Completed.	<p>ISO 14001 has been successfully renewed in 2017.</p> <p>Both Tullow Group and TGL plan to obtain the certification for the new ISO 14001:2015 standard in 2018.</p> <p>The EMP remains the main TGL plan providing guidance on the environmental management framework.</p>
7	The Project will disclose the EMP, including this Action Plan, to local communities as it evolves and report on completion of its action items.	<p>(a) Inclusion of a draft EMP disclosure and reporting procedure in the Project's Public Consultation and Disclosure Plan.</p> <p>(b) Disclosure of EMP updates, including this Action Plan, and public disclosure of EMP completion reporting.</p>	Completed and ongoing. ESMS updates provided annually in AMR.	Disclosure and engagement activities on project progress for affected communities are regularly organized, as detailed in section 5.4.2.



ENVIRONMENTAL AND SOCIAL ACTION PLAN Tullow Oil (#27918 and 31483) April 9, 2014				
Item	Action	Completion Indicator	TGL Update/Comments	May 2018 Status IESC
8	The Project will develop a staffing and training plan to ensure the ongoing management of the project according to the commitments in the ESIA and EMP.	The Project has developed and submitted a draft plan acceptable to IFC.	Completed.	TGL provided trainings are fully described in the AMR and MODEC training matrix has been reviewed during the site visit. Training is detailed further in sections 5.1.2 and 5.3.4.
9	The Project will retain a qualified, independent external expert to verify its environmental and social monitoring information.	The Project has hired a qualified, independent external expert, acceptable to IFC, based on a term of reference agreed by IFC. The Project has publicly disclosed the report of the external expert annually.	Completed and ongoing.	External monitoring in place as per scope of work of the present site visit and report. Annual reporting ongoing.
PS2: Labor and Working Conditions				
10	The Company will have a Human Resources Policy that communicates to workers their rights under Ghanaian law and spells out terms of employment, including equal opportunity principles, benefits, and leave policies.	The Company has developed and submitted the policy acceptable to IFC.	Completed.	In general, good management of Human Resources (HR) is acknowledged at TGL. More detailed information is provided in section 5.1.1.

ENVIRONMENTAL AND SOCIAL ACTION PLAN Tullow Oil (#27918 and 31483) April 9, 2014				
Item	Action	Completion Indicator	TGL Update/Comments	May 2018 Status IESC
PS3: Pollution Prevention and Abatement				
11	The Project will define routine inspection and maintenance of engines, generators, and other equipment, noise, and air emissions monitoring and use of low-sulfur diesel fuel, as part of the Project's environmental monitoring program.	(a) Availability of the Project's environmental monitoring program for the drilling and field installation and production phase acceptable to IFC. (b) Revised environmental monitoring program for the production operations phase, acceptable to IFC.	Completed.	Environmental monitoring ongoing in line with the EMP. Environmental monitoring results for 2017 have been provided to IESC, and results summarized in the AMR. Most of the monitoring requirements for the period under review have been met at the time of the site visit. Some comments and suggestions have been included in section 5.2.
12	The Project will maintain a monitoring program for greenhouse gases (GHG).	Periodic public reporting of GHG emissions for the Jubilee Field production operations.	Completed and ongoing.	Ongoing. Data provided through AMR report to IFC and statutory reports to Gh EPA. The AMR 2017 reports an increase in GHG emissions compared to 2016, mostly due to flaring from the commissioning of the TEN FPSO and several maintenance activities being carried out on the KNK FPSO. Additional details can be found in section 5.2.3.
13	The Project will include drilled cuttings and fluid disposal methods and procedures in the Project's Waste Management Plan. A cuttings deposition model will be developed and included in the Jubilee Field ESIA.	Availability of the cuttings deposition model and the drilled cuttings and fluid disposal methods and procedures, acceptable to IFC.	Completed.	Log of all drilling waste produced and disposed of are provided within the relevant Well Terminal Reports, and to the Gh EPA. No drilling activities were undertaken in 2017. In February 2018 TGL commenced the multi-year incremental drilling program to maximize production.

ENVIRONMENTAL AND SOCIAL ACTION PLAN Tullow Oil (#27918 and 31483) April 9, 2014				
Item	Action	Completion Indicator	TGL Update/Comments	May 2018 Status IESC
14	The Project will ensure that a Hydrotest Water Disposal Plan will be prepared.	Availability of the plan, acceptable to IFC.	Completed.	No update reported or further action needed.
15	The Project will install a produced water discharge sampling point in the FPSO and relevant procedures developed.	Availability of the sampling point and procedures, acceptable to IFC.	Completed.	Produced water is continuously monitored through an analyser and off-spec water is automatically diverted to the Off-spec Water Tank for further treatment and/or additional retention time. Results of sampling are provided in the AMR and data presented to the monitoring team. No further action required.
16	The Project will develop tanker vetting procedures to ensure compliant management of ballast water. Ballast water management measures will be detailed and included in the environmental management system for operations.	Availability of tanker vetting and ballast water management procedures, acceptable to IFC.	Completed.	Both components are embedded within the EMP reviewed by TGL in 2015. Monitoring results of 2017 show ballast water used only by JEAM FPSO.
17	The Company will update the Drilling Waste Management Plan (WMP) to include methods and procedures, adopted by the Project for the management of drilled cuttings and fluid disposal, and all planned activities during facility installation, as needed. An Operations Phase WMP will then be developed. Audits of the waste management facilities regularly	(a) Availability of a draft Project's WMP and Chemical Handling (COSHH) Procedure for the drilling and installation phase, acceptable to IFC. (b) Waste Management Plan and Chemical Handling (COSHH) Procedure for the production	Completed.	The WMP has been reviewed in 2015. The updated version is currently under review. Monitoring requirements remain in place and are regularly implemented by the Project. Monitoring results have been provided for 2017 and additional details incorporated in the AMR (see section 5.2.1 for details). Waste handling and management is ongoing with TGL expanding their waste management handlers to assist in the development of local providers.

ENVIRONMENTAL AND SOCIAL ACTION PLAN Tullow Oil (#27918 and 31483) April 9, 2014				
Item	Action	Completion Indicator	TGL Update/Comments	May 2018 Status IESC
	conducted. The Chemical Handling (COSHH) Procedure will be implemented to handle all hazardous chemicals and the Company will ensure that it is adopted by its contractors.	operations phase, acceptable to IFC.		
18	The Project will update the existing Emergency Response Plan (ERP), to include response procedures to emergencies potentially associated to all construction and production operations activities planned, including fire prevention and protection, environmental emergencies, and other incident responses.	(a) Availability of a draft Project's ERP for the drilling and installation phase, acceptable to IFC. (b) ERP for the production operations phase, acceptable to IFC.	Completed.	ERP remains in place and is updated as necessary. No further update.
19	Quantitative modeling of defined potential surface and subsurface oil spill release scenarios will be conducted and an assessment of potential for oil spill related impacts to offshore and coastal environmental resources, including turtle nesting beaches, will be conducted for both the drilling/installation phase and the production operations phase, and	(a) Availability of the Project's OSCP for the drilling and installation phase, including the spill trajectory model, acceptable to IFC. (b) OSCP for the production operations phase, acceptable to IFC.	Completed.	Current OSCP for the production and operations phase remains in place. The Jubilee OSCP is set to cover TEN Operations, with response resources and equipment to be shared with TEN.



ENVIRONMENTAL AND SOCIAL ACTION PLAN Tullow Oil (#27918 and 31483) April 9, 2014				
Item	Action	Completion Indicator	TGL Update/Comments	May 2018 Status IESC
	incorporated in the Oil Spill Contingency Plan (OSCP). The OSCP will define specific measures for protecting turtle habitat and other protected and sensitive coastal habitats. The Project will develop spill scenarios for the operations phase Oil Spill Contingency Plan (OSCP).			
20	The Project will develop and adopt a H2S Program and ensure that it is also adopted by its contractors, as needed.	Availability of the Project's H2S Program, acceptable to IFC	Not applicable.	No further update reported or action needed.
PS4: Community Health, Safety and Security				
21	(a) The Project will develop a program to avoid intrusion into the safety zones around the drilling rigs and FPSO to include: Education program for the nearby villages and other fishers known to use the project area. (b) Procedure for boat traffic management and for warning boats away from the safety zone, including rules of engagement for use of physical intervention.	(a) Education program information and schedule for meeting with villages. (b) Procedures provided to and accepted by IFC. (c) Security Plan provided to and accepted by IFC.	Completed and ongoing.	Education and awareness programs with fishermen and their representatives are still ongoing. Focus in 2017 was on seismic surveys, while in 2018 it will be on drillings. Procedures for offshore facilities and managing traffic along with the Security Plan consistently implemented. TGL focuses its effort not only on enforcing the access prohibition to the AZ and EZ but also in preventing canoe incursions. Sections 5.4.1 and 5.4.4 provide details on the management of Sea Access and on the implementation of the prevention strategy for canoe incursions. A Social Performance Induction for Navy Deployment has been recently developed by TGL in compliance with the Voluntary Principles on Security and Human Rights.



ENVIRONMENTAL AND SOCIAL ACTION PLAN Tullow Oil (#27918 and 31483) April 9, 2014				
Item	Action	Completion Indicator	TGL Update/Comments	May 2018 Status IESC
	(c) The Project will develop a security plan, based on a security risk assessment, which may include, among other things, the adaptation of the US-UK Voluntary Principles on Security.			
PS6: Biodiversity Conservation and Sustainable Natural Resource Management				
22	The Project will develop and implement a program for training vessel's and helicopter's operators in marine mammal observation and monitoring at and in the vicinity of the proposed Jubilee Field development. The program will be included in the final Jubilee ESIA and developed in consultation with the Ghana EPA.	(a) Availability of the program, acceptable to IFC. (b) Observations analyzed by an experienced marine mammal biologist and reported in the annual monitoring report to IFC.	Completed and ongoing.	Program in place and consistently implemented. MMO trained Offshore EHSS Coordinators spotters continue to collect data and report on a monthly basis. Overview incorporated in the AMR. Annual MMO report once completed will be delivered to Gh EPA. No issues to report.
23	The Project will develop and enforce a specific policy and procedures to ensure that traffic and operations of drilling vessels, support vessels and helicopters will minimize disturbance to marine mammals.	Availability of the policy and procedures, acceptable to IFC	Completed.	Procedure remains in place. No update for 2017.



ENVIRONMENTAL AND SOCIAL ACTION PLAN Tullow Oil (#27918 and 31483) April 9, 2014				
Item	Action	Completion Indicator	TGL Update/Comments	May 2018 Status IESC
24	The Project will ensure that support helicopters will routinely avoid flying over the Amansuri wetland and that, if avoidance is not feasible due to weather conditions, a minimum altitude will be specified, according to international good practice, when flying over this area to minimize disturbance to wildlife.	Availability of the policy and procedures, acceptable to IFC	Completed.	Procedure in place. No further update reported or action needed.
TEN Project				
25	TGL will develop a Safety Case for the TEN Project, including definition of environmental and societal hazards, and demonstrating ALARP levels for all relevant risks, including risks to coastal resources.	Availability of the Safety Case and closeout of all mitigation measures identified to demonstrate ALARP levels, acceptable to IFC	Completed TEN Safety case in place.	TGL developed specific safety cases for each of the two FPSOs in 2016. Jubilee and TEN safety cases were revised and reissued in 2017.
26	TGL will develop an updated integrated OSCP for both Jubilee and TEN, which will include: a) Blowout Prevention and Control Plan (including measures identified by the relief well feasibility study). b) Well Control Emergency Response Plans for the TEN field.	Availability of the integrated OSCP, acceptable to IFC.	Completed Current Jubilee OSCP used as a base document to develop a specific contingency plan for TEN Operations.	The Jubilee OSCP is set to cover TEN Operations, with response resources and equipment to be shared with TEN.



ENVIRONMENTAL AND SOCIAL ACTION PLAN Tullow Oil (#27918 and 31483) April 9, 2014				
Item	Action	Completion Indicator	TGL Update/Comments	May 2018 Status IESC
27	TGL will include the TEN Project to the scope of work of the independent external expert.	The Project has reviewed and updated the terms of reference of the independent external expert, acceptable to IFC. The Project has publicly disclosed the report of the external expert annually.	Completed (2017)	External monitoring in place as per scope of work of the present site visit and report. Annual reporting ongoing.
28	TGL will review and update all plans and procedures agreed and developed for Jubilee field as part of the ESAP, for implementation at the TEN Project.	Availability of the relevant updated plans and procedures.	All relevant environmental and social management plans have been updated to Cover TEN operations. Environmental Management Plan, Waste Management Plan Environmental Monitoring Plan Ghana Incident Management Plan TEN Oil Spill Contingency Plan Public Consultation and Disclosure Plan	Relevant environmental management plans have been updated to cover TEN operations. The Public Consultation and Disclosure Plan (PCDP) should be updated to reflect the latest changes in the <u>engagement strategy</u> (including formal reference to the TEN Project).

5 REVIEW OF PROJECT MONITORING DATA AND SITE VISIT FINDINGS

Consistently with the scope of work, as defined in Section 2 of the present report, during the visit the IESC group undertook an extensive review of the project environmental, health & safety and social monitoring data as reported in the TGL corporate documents, statutory reports to Ghana EPA and AMR to the IFC. This review has been supplemented with the visit to the Project facilities, as described in Section 3, in order to evaluate the TGL Environment, Health, Safety and Social performance performances with respect to the ESAP and related plans requirements.

The relevant findings of the review of the Project Monitoring data and site visits conducted are presented in the following sections and structured in order to reflect the different monitoring components applicable to the Project.

Along with the check of consistency between required, collected and reported data, some observations relevant to possible improvements of current Project practice in implementing monitoring requirements are provided.

5.1 ESMS ORGANIZATION AND REPORTING

A key factor for the successful implementation of a project ESMS is the availability of adequate staff resources, training programs and reporting standards, consistent with ESAP requirements.

Over the past two years, TGL has worked on the adoption and integration of the Tullow Group Integrated Management System (IMS) into the TGL management system (the Operations Framework, OF). The system is now fully operational and covers all the management aspects of Non-Technical Risks. Recently, TGL has reviewed its management system to confirm compliance with Group IMS and local legislation and regulations. An internal audit was conducted to assess how effectively TGL management system is aligned with Group requirements. The results of the audit will be available in the second quarter of 2018 and will be followed by an action plan with timelines to achieve full compliance. TGL reported that no major non-compliances result is expected.

The Jubilee FPSO (KNK FPSO) is owned by TGL whilst MODEC act as the O&M contractor, and as such the EHS Management System reflects the structure of TGL OF. The TEN FPSO (JEAM FPSO) is owned and operated by MODEC and therefore implements an EHS Management System based on MODEC corporate standards.

In the case of JEAM FPSO, TGL as field operator is responsible only for assuring that the arrangements are adequate and that MODEC procedures and processes meet or exceed the Tullow Corporate EHS requirements. In addition, where support or interfaces are required with TGL, interface/bridging procedures are developed and integrated into the overall TEN EHS Management System.

Further to the above, other facilities which form part of the Jubilee and TEN projects have different ownership. For instance, subsea installations (wells, manifolds, etc.) of the TEN field are owned by TGL whilst the JEAM FPSO installations are owned by MODEC. Based on the above, a full understating of the various Project interfaces (e.g. TGL/ MODEC) still appears to be difficult. For this reason, IESC reiterates the past suggestion to include in the next issue of the AMR a thorough description of all Project interfaces (both Jubilee and TEN field) including details relevant to their management.

5.1.1 Organization and Staffing

TGL workforce at the time of the site visit consisted of 363 persons, 73% of which are Ghanaians. A general good management of Project personnel is acknowledged, with no major issues reported in the past year. The Employee Engagement Forum, which was launched in 2015 to discuss employee concerns and input into key business initiatives, is becoming more and more structured, with a proper statement and operating rules. The Employee Relations Procedure defining workers internal grievance mechanism continues to exist. Two grievances were raised by employees in 2017: both employees complained about their performance assessment and feedback by their managers.

Regular coordination activities continue to take place between TGL and MODEC Human Resources (HR) in order to prevent possible workers' strikes from reoccurring.

TGL management, the Business Unit Leadership team (BULT), has partially changed. In particular, a new TGL Managing Director and TGL EHS and Asset Protection (EHSAP) Manager have been appointed. These positions continue to be supported by the same Environmental Team Lead, Asset Protection Team Lead and the Health and Safety Team Leads. The EHSAP structure remains adequate for the current activities.

The Social team organizational structure is not captured under the EHSAP structure, and is kept separate under the organigram of Sustainability and External Affairs. The position of the SP Manager has remained stable since 2015 while some replacements occurred in the composition of the SP team.

Two CLOs, out of the six formerly part of TGL SP team, have left (one resigned, one changed position within the Company) and their positions are currently vacant. TGL is defining how to cover these positions (i.e. options include hiring new persons or using Kosmos CLOs).

Due to the latest changes in TGL personnel, IESC suggests organizing a refresher training session in IFC PSs (2012 version).

TGL working relationship with the CLOs continues to represent a problematic situation. For several years they have been reporting general discontent related to their salary, increased workload, inadequate tools and limited transportation allowances. Last year, CLOs received a salary adjustment, new mobile phones and notebooks and the possibility to occasionally use TGL cars if organized in advance.

Nonetheless, CLOs still report difficulties in covering transport expenses within the provided allowance and for the need to pay out-of-pocket for small daily expenses. Furthermore, not all of them have an office (home-based work) and, more in general, they claim a lack of recognition and opportunities within the company structure (they are hired through a contracting company).

Being a longstanding issue, TGL should seek an acceptable solution to these problems and to improve the CLO working conditions as acknowledgment of the important role they cover. This aspect is particularly important now that the number of competitors in the O&G market is increasing, which are looking for positions with similar experience and background. The resignation of other CLOs would represent an important loss for TGL, who should invest resources to train new people and establish new relationships in the affected communities.

5.1.2 Training

The training program offered by TGL to its staff in 2017 covered several topics: oil spill management and response (IMO level III), advanced process risk assessment and process safety management, training on business continuity in case of serious incidents or disasters, first aid training, dropped object prevention training, internal risk and assurance workshops, defensive driving training, malaria online awareness training, and marine mammal observation training. One training session on the stakeholder engagement software *Borealis* has been provided to the SP team (see section 5.4.2).

The AMR provides information on TGL staff training only, even if for some specific sessions relevant contractor personnel were invited to participate. TGL ensure competency of MODEC or other contractor employees by auditing contractors training programs and through the collection of specific Key Performance Indicators (KPIs) (details are provided in section 5.3.4).

As anticipated in the former paragraph, IESC suggests organizing a training session in IFC PSs to facilitate familiarization with this topic of the new BULT and EHSAP staff.

5.1.3 Certification

Regarding offshore operations in the Jubilee and TEN oil fields, TGL operates under a range of permits for drilling, workover and production. Jubilee Field Production Operations Environmental Certificate (received the 25th May 2015) remains valid until 25 May 2018. The TGL Environmental Management Plan was updated in 2017 and submitted to the EPA as required to secure the renewal of the Jubilee Environmental Certificate. The Certificate covers the ongoing KNK FPSO production, operations logistical support including the chemical support facility. In 2017 TGL received the TEN Field Production Operations 3-year Environmental Certificate (CE0018280622) covering the ongoing FPSO TEN production, operations logistical support and the chemical support facility. TEN certificate will remain valid until 31 December 2020.

The environmental certificate states that there will be no production flaring of associated gas, and that any flaring beyond the 3% limit will incur administrative charges, unless a waiver is submitted and approved by the Gh EPA. Additional details on flaring can be found in section 5.2.3.2.

TGL obtained its first standalone ISO 14001:2004 Certification for the EMS on 31st October 2012, applicable to the activities including and associated with exploration and production of oil and gas from their Jubilee Field and their management through partnership agreements and contract. TGL continues to use ISO14001 to verify the effectiveness of its environmental management systems and in 2018 both Tullow Group and TGL plan to obtain a recertification to the new ISO14001:2015 standard.

5.1.4 Periodical Review of ESAP Related Plans

ESAP requirement #6 refers to regular TGL review and amendment of the EMPs. The Environmental Management Plan, which is the main document providing guidance on environmental management for Jubilee and TEN, has been updated in March 2018 and will remain valid in its current revision for the next two years. For the 2017 reporting period, the monitoring requirements are still undertaken according to the TGL Monitoring Plan (TGL-EHS-PLN-04-0006). IESC noted that some of the TGL EMPs, such as the Environmental Monitoring Plan and the Waste Management Plan, have not been reviewed within the nominated time frame (annually, or every 2 years depending on the document).

The IESC suggests, as per the last site visit, that TGL provides an updated list of the key TGL environmental management documents, outlining the document review cycle and the most recent review undertaken. The IESC is also aware that should any significant change be required to the plans, these are covered under the Management of Change (MOC) process.

5.1.5 Management of Change

The MOC procedure is required within the ESMS, in order to effectively manage changes that may be needed with respect to the recommended practice or standards and in order to meet and reflect the operational issues encountered by the Project. In compliance with ESAP requirement #5, the Project continues to adopt a MOC system. The MOC procedure (TGJ-OPS-PRC-12-0001) has been issued in May 2017 to account for the implementation of BEST (Brownfield Engineering System Toolkit). BEST is an online web-based system designed to manage MOC requests but also Root Cause Analyses (RCA), Technical Queries (TQ), Case To Operate (CTO), etc. via dedicated software modules.

BEST is now operational for both Jubilee and TEN projects (for all the commissioned and performance tested components). As already stated in the past, IESC considers the proposed MOC procedure to be adequate for ensuring that engineering and operational changes are properly documented and approved and that the risks associated are carefully assessed to avoid potential hazardous conditions.

In total, 178 MoCs for engineering changes have been raised in 2017 (134 from Jubilee and 44 from TEN).

5.1.6 Reporting

The TGL EHS team provides updates on performed monitoring activities within a number of different reports, including statutory reports to Ghana EPA (provided monthly and annually) and the AMR to the IFC.

In agreement with the scope of work, a verification of consistency of the data reported with respect to the monitoring requirements has been carried out by the IESC. In addition, a review of the report formatting and organization (including the recommendations made to TGL as part of the site visit carried out by the IESC over the last couple of years) has been carried out in order to identify possible areas for improvement.

For what concerns the 2017 AMR, the IESC noticed a general improvement of the information provided compared to the previous year's report, in particular with reference to the social sections. Specific suggestions for improvement are however provided in the following paragraphs with reference to each component.

5.2 BIOPHYSICAL COMPONENTS

The following paragraphs present the outcomes of the conducted review of the biophysical environmental monitoring data and Project practice with respect to TGL procedural requirements (the EMPs and the E. Mon. P). For each component, the data and information provided by TGL along with the observations, recommendations and suggestions for improvement are reported.

5.2.1 Waste Management

Waste management produced at the Project facilities continues to include the following main streams:

1. solid waste from FPSOs;
2. drill cuttings and fluids;
3. barite waste;
4. produced sand;
5. natural occurring radioactive materials; and
6. other wastes as defined in the WMP.

All the above components are managed according to the provisions of the Waste Management Plan (WMP) (TGL-EHS-PLN-04-0008) revised in July 2015. The updated version of the WMP, currently under revision, should have been issued in July 2017.

5.2.1.1 Disposal of Solid Waste from FPSO

In accordance with MARPOL requirements, environmental monitoring records and information provided by TGL covering both FPSOs outlines that discharge into the sea consists of treated sewage and food waste. A verification of the records on garbage collected and sewage water discharged to sea was conducted on board the KNK FPSO during the 2018 monitoring visit.

Quantities of waste disposal to sea and shipped to shore are included in monthly reports provided to the Gh EPA and tracked in a monthly waste tracking spreadsheet. Reporting of quantities discharged continue to be consistent with TGL EMP requirements, and are presented and summarized in the AMR.

During 2016 monitoring visit offshore to the KNK FPSO, the IESC was informed that the food macerator was out of order, and that FPSO staff manually chopped food waste prior to disposal overboard. It was observed that there was no netting or filtration for the food waste on the current food waste disposal chute, therefore the manual chopping measure taken by MODEC was unlikely to obtain the macerator size required by MARPOL (<25 mm).

During the 2017 site visit, it was reported that the food macerator had been put back in service in 2016 but that it failed again twice during the same year and at the time of the site visit it was not in operation. TGL reported that the macerator failure was due to inadequate design of the machine and the pipes (the capacity of the unit was insufficient and the pipes were too small). The unit was replaced with a larger unit, however, the discharge pipes were not substituted and as such it got repeatedly blocked upon usage. The IESC observed during the 2018 site visit that the food macerator is still not in operation and according to TGL this will be rectified during the galley and mess upgrade scheduled for the 14th and 15th July 2018. As part of the works, the existing 50 mm pipework from the macerator will be upgraded to 75 mm (going through the deck), while the existing 65 mm pipework (below deck) will be upgraded to 100 mm pipework.

While the IESC appreciate that the Project attempted on more than one occasion to rectify this issue after the 2016 IESC site visit, should this situation not be resolved as a matter of priority, and prior to the next IESC visit, this issue will be reported as a non-compliance. TGL need to provide evidence to IESC demonstrating that MODEC has installed the new macerator unit system and continue to operate in line with applicable regulations (in this case MARPOL regulations that food waste macerated to <25mm).

5.2.1.2 Drill Cuttings and Fluids

The relevant data concerning well features and the quantities of chemicals employed and lost/discharged to sea are provided in the Rig Environmental Monitoring Reports, which are submitted monthly to the Gh EPA.

The main requirement set for this waste category concerns the maximum allowable Oil on Cuttings (OOC) concentration for the Non-Aqueous Drilling Fluids (NADF) discharged to sea, which must not exceed 2% by weight on dry cuttings. According to Gh EPA requirements, in case of failure to meet the above level of OOC, TGL pays a surcharge of USD 20,000.00 per well if OOC falls within the 2-5% range.

No drilling activities were undertaken in 2017, therefore no cuttings and drilling fluids have been discharged.

New drilling and completions activities commenced in 2018 as part of the Jubilee Full Field Development activities, which foresee the drilling of four new wells by the end of the year: discharge quantities of cuttings and drilling fluid are expected to be reported in the 2018 AMR.

5.2.1.3 Barite Waste

Barite is used as the weighting agent for drilling fluids by the Project. Barite quality testing is performed before its use, as per the EMP, by checking the concentration levels for Mercury (maximum acceptable concentration 1 mg/kg) and Cadmium (max 3 mg/kg) for each stock delivered to the Takoradi port.

No barite waste was produced during 2017.

5.2.1.4 Produced Sand

Produced sand is derived from gravimetric separation of oil collected and treated at the FPSOs. The EMP requires the control of oil concentration in sand before discharging: residual concentration must be less than 1% as per IFC and Gh EPA requirements.

According with the 2017 AMR no sand was produced or discharged from the FPSOs.

5.2.1.5 Naturally Occurring Radioactive Materials

The presence of Natural Occurring Radioactive Materials (NORM) possibly embedded in the drill cuttings recovered and within tubulars or casing and equipment used, is required to be monitored by the Project. Measurements are conducted on-board the FPSO using a Geiger meter. In 2015, following a NORM positive test result on-board the FPSO, TGL developed the NORM procedure aimed at applying the correct management of NORM within the Project. According to the procedure, potentially NORM contaminated equipment is temporarily stored in a demarcated area on-board the FPSO. During the May 2018 site visit, no NORM material on board the KNK FPSO was reported.

At the temporary storage area on the KNK FPSO main deck, the IESC observed generic equipment stored and covered by plastic cloth with a NORM label (a securing belt). The equipment, however, was not NORM contaminated. This appears to have been caused by a worker error, could however be misleading and lead to potential unnecessary misinterpretation in the management of that material. The IESC suggests MODEC/TGL to check for the presence of similar old belts on the FPSO, and if found dispose off/regulate their use to actual materials classified as NORM.

5.2.1.6 Other Wastes

Beside the above listed and described waste categories, the Project generates a large number of wastes which are managed in compliance with the TGL Waste Management Plan (WMP). Waste categories include paper and plastic, metal scraps, wood, food and hazardous wastes, including chemicals, tank slops, oily sediments, oils, fluorescent lights and batteries. TGL continues to segregate waste into five waste categories (i.e. metal, wood, plastic, general and hazardous) both onshore and offshore. During the site visit, all the Project Facilities showed an adequate level of waste segregation. These wastes are collected and disposed onshore through the appointed Waste Management Contractors, Zeal and Zoil, both based in Takoradi. The updated Waste Manifest Form to improve the waste tracking system (and observed by the IESC during the visit) is still in place; it incorporates six duplicate (carbon) pages in different colors (as presented in Appendix 1 of the WMP) and must be completed and accompanies transfer of any waste between TGL facilities and /or all waste handlers.

The 2017 AMR describes clearly the quantities and the final disposal of both hazardous and non-hazardous wastes generated by TGL.

5.2.1.7 Waste Management Contractor in Takoradi

TGL continues to work positively with the local waste contractor "Zeal Environmental Technologies" and "Zoil". From 2016, Zoil has been contracted by TGL in order to introduce competition within the waste management arena of the Takoradi region and therefore improve their local waste management capacities and practices.

During the 2018 site visit, the IESC was not able to visit Zeal and Zoil facilities due to time constraints. TGL informed that both facilities are well managed with a high level of housekeeping and adequate pollution prevention measures.

Currently Zoil receives only general waste produced by TGL and Zeal continues to provide the following services:

- ✓ treatment of oily water;
- ✓ cleaning and compacting of used drums;
- ✓ recycling of plastic, metal and wood wastes;
- ✓ collection of hazardous waste (currently stored in drums in a covered and protected area below a newly constructed shelter);
- ✓ incineration of hazardous waste;
- ✓ recycling of drilling cuttings and ash through stabilization with cement and lime and production of construction bricks; and
- ✓ several other waste segregation and processing activities.

Zeal is still investing in soil bioremediation in order to increase the amount of soil treated and slowly replace the stabilization of mud with cement and lime for production of construction bricks.

TGL continues to undertake annual audits of Zeal facilities to determine the level of compliance with Company's procedures and to follow up on Audit recommendations from the previous year.

5.2.2 Waste Water Management

Several waste water streams are monitored by the Project in accordance with EMP requirements. These include:

- ✓ produced water (from crude oil treatment at FPSOs);
- ✓ sewage water;
- ✓ deck drainage, bilge water and ballast water;
- ✓ FPSOs' ballast water;
- ✓ desalination Plant Brine Discharge;
- ✓ desulphation water (associated with the Desalination Plant);
- ✓ well completion and work over fluids;
- ✓ spills; and
- ✓ shore base liquid discharges.

5.2.2.1 Produced Water

Produced water is derived from gravity separation of crude oil collected and treated on the FPSOs. It is discharged to sea following treatment process. Prior to discharge, verification of oil in water content is conducted to ensure the discharge reference limits (IFC guideline limits of <42 mg/L daily maximum and <29 mg/L daily average over a one-month period) are met. Prior to being sent overboard, after being cooled to 40°C in the Produced Water Coolers, water quality is continuously monitored through an analyser and off-spec (oil concentration > 20 mg/L) water is automatically diverted to the Off-spec Water Tank for further treatment and/or additional retention time.

The data collected are consistently reported in the AMR and in monthly reports to the Gh EPA. Data are monitored directly on both FPSOs throughout the day at the laboratory located on-board. TGL takes quarterly control samples and sends them to certified laboratories to attest to the validity of on-board analysis.

Oil in water (OIW) content performance against monthly average EPA and IFC discharge limits from produced water was met on both FPSOs throughout 2017.

Table 5.1: Produced Water Annual Concentration for 2017

Liquid Effluent Parameters	IFC Guidelines Level (mg/l)	Ghanaian Maximum Level Concentration (mg/l)	Jubilee Performance (Annual Average of monthly samples, mg/l)	TEN Performance (Annual Average of monthly samples - mg/l)
Produced Water – Oil and Grease (30 days average)	29	29	14.58	7.72
Produced Water – Oil and Grease (maximum daily)	42	42	20.85	12.14

5.2.2.2 Sewage Water

Sewage water on the FPSOs continues to be treated on-board and checked for residual chlorine content before discharge (Cl < 1 mg/L). Chlorine content is analysed on-board, while presence of floating solids and discoloration is conducted visually by the on-board personnel. No exceedances were reported to the IESC.

5.2.2.3 Deck Drainage, Bilge Water and Ballast Water

All three waste water streams are collected on-board and conveyed to a retention tank, connected with an Oil Water Separator (OWS) unit. Monitoring of effluent wastewater quality is conducted through an automatic online analyser to check for presence of oil in water (maximum allowable discharge limit set at 15 mg/L). Daily records on concentration measured and quantity discharged are recorded and presented in monthly reports to the Gh EPA. No exceedances were reported.

5.2.2.4 Well Completion and Work over Fluids

These waste water streams mainly consist of oily water with Calcium Chloride used for well testing and clean up. According to EMP requirements oil in water content has to be checked prior to discharge (maximum allowable discharge limit set at 15 mg/L, plus pH in the 6-9 range). This stream is continually analyzed on-board the MODUsr prior to discharge. In the event of exceedances, it is collected and disposed of at the Zeal waste facility where it is treated through the oily water treatment unit. Logs of quantities and chemical tests are correctly collected by the Project. No exceedances were reported.

5.2.2.5 Spills

The AMR (2017) lists 6 environmental incidents including 2 uncontained liquid spills, 2 minor gas leaks and 2 contained low volume spills.

The 2 main spills occurred on the TEN FPSO. The first one was due to the damage, during offloading operation, of the hose section punctured by the long beak of a marlin fish, approximately 7.03 m³ of crude were released into the sea. The second spill, around 2.5 m³ occurred at the interconnection of a hydrocarbon system to a utility system via temporary utility hose to a live process during maintenance.

TGL classifies environmental incidents leading to the release of pollutants (mainly oil and gas releases) to the natural environment using the environmental harm index. The harm index is used to ascertain the actual and potential severity of an environmental harm caused by considering the type of material spilled/released and quantity, toxicity of the material and sensitivity of the receiving environment to give a harm quotient and subsequent classification.

The index returns two levels of Environmental Incident Severity: Potential and Actual Severity. TGL reports in the annual Summary of OHS KPI only the spills that recorded an actual severity level greater than 3.

The following table reports the description of the Environmental Severity Levels.

Table 5.2: TGL Consequence Severity Table

Environmental Severity Levels	Consequences
Level 1	No lasting effects. Low-level impact on biological or physical environment. Limited damage to minimal area of low significance. Clean up within days.
Level 2	Minor effects on biological or physical environment. Minor short-medium term damage to small area of limited significance. Clean up within weeks.
Level 3	Moderate effects on biological or physical environment but not to effecting ecosystem function. Moderate short medium term widespread impacts (e.g. oil spill causing impact on shoreline). Clean up within months.
Level 4	Serious Environmental effects with some impairment of ecosystem function (e.g. displacement of species). Relatively widespread medium long terms impacts. Clean up within months-years.
Level 5	Very Serious Environmental Effects with impairments of ecosystem function. Long term, widespread effects on significant environment (e.g. unique habitat, National Parks). Long term clean up required.

The IESC suggests in the next AMR's to clearly show in a table all the liquid and gas spills and releases with their potential and actual severity level including a description of the most relevant incident according to the harm index score (<3) . The IESC would like to see this suggestion implemented in the AMR.

5.2.2.6 Shore Base Liquid Discharge

The IESC inspected the Takoradi pipeyard but, due to time constraints, it was not possible to visit the chemical storage area at Takoradi seaport currently managed and operated by Nalco Champion (Ecolab Company) and the

Sekondi naval base. The stormwater drainage system at the Takoradi pipeyard area is unchanged (incorporating a closed drain system with a security valve, sufficient secondary containment, and an OWS which is periodically purged). Reportedly, no modifications have been executed at the chemical storage area at the seaport and at the Sekondi base. At the seaport, stormwater is collected from the drainage system and periodically analysed prior to its discharge into the sea; at the Sekondi base stormwater is drained into a drainage field system that empties into the Port. No issues are reported.

5.2.3 Air Quality

The main environmental parameters required to be assessed under the EMP Air Quality monitoring requirements are:

- ✓ emission testing, including: point emission sources from combustion devices on-board the FPSOs, point emission sources from onshore activities, fugitive emissions and flaring; and
- ✓ ambient air quality monitoring at FPSOs and shore bases.

5.2.3.1 Emission Testing

The AMR reported in detail the Green House Gases (GHG) emissions data of the Project for 2017. The GHG quantification is based on the use of empirical formulas starting from the fuel type and quantities used at each combustion source. GHG emissions from various sources within TGL offshore operations for 2017 are illustrated in Table 3. The GHG emissions are quantified taking into consideration FPSOs production operations, well engineering operations and Aviation and Marine Transportation activities (including fixed wing and helicopter aviation and marine supply vessels).

TGL activities resulted in a total of 1,494,870 tonnes of CO₂ equivalent (tCO₂ eq) in 2017.

Table 5.3: Total GHG Emission by Source TGL Activities in 2017

	Production Operations - Jubilee and TEN FPSOs' Total tCO ₂ eq		Aviation and Marine Transport Total tCO ₂ eq		TGL Total tCO ₂ eq
	FPSO MV 21	FPSO MV 25	Marine Transport	Aviation Transport	
GHG Emission 2017	585,776	836,563	69,611	2,920	1,494,870.

Compared to the total GHG emission in 2016 (approximately 1,004,324 tCO₂ eq), the total amount of emissions in the period under review has increased. The increase in GHG emission is mostly due to the high rate of flaring from the TEN FPSO while undergoing a prolonged commissioning period.

The annual fugitive emission campaign was not performed on the KNK FPSO in 2017. Reportedly, the FLIR camera is now applied for routine maintenance and gas leak detection, however the IESC would like to see clearly reported in the next AMR the list of significant fugitive emission sources identified for the period under review.

The annual stack emission monitoring on the KNK FPSO was carried out in June 2017. The stack emission testing was done to quantify emissions from the following sources:

- ✓ Gas Turbine Generators (GTG) A, B and C;
- ✓ Deck Boiler;
- ✓ Fire water Pump Forward; and
- ✓ Port Side Crane and Starboard Crane.

The sampling included the measurement of O₂, CO, NO, NO₂, NO_x, CO₂, SO₂, and TOC as CH₄. Based on the results provided, the concentrations of NO_x measured at the GTG A, GTG B and GTG C, respectively 299.0 mg/Nm³, 279.2 mg/Nm³, and 289.3 mg/Nm³, exceeded IFC Guideline Level applicable to gas fired turbines (51 mg/Nm³). Although GTG B and GTG C show concentrations of NO_x slightly lower than the last campaign performed in May 2016, NO_x have been regularly detected at the GTGs over the last few years of monitoring. In past visits

the IESC verified manufacturer design specification to determine normal operating emission levels of the generators, with no irregularities found. Although emission levels of NO_x continue to exceed the IFC levels, TGL concluded that NO_x was not an EHS problem on the FPSO as supported by the results of the 2017 ambient air survey undertaken on-board which did not show any exceedances against World Health Organization (WHO) and Gh EPA limits. The annual stack emission for TEN was not carried out in 2017 due to other operational priorities since the facility was still in commissioning phase, the stack emission campaign will be conducted in 2018.

IESC would like to see the Annual Stack Emission Monitoring Campaign results described in the AMR. Flaring

Based on TGL EMPs and agreements defined by the Gh EPA, flare use is limited to discharges in case of process upsets and maintenance operations of equipment/tanks. Reportedly, whenever monthly flaring exceeds 3% of total gas production a flaring justification note clarifying the reason for increased flaring is submitted to the EPA for review and approval. The Jubilee Operational Environmental Certificate was renewed without any issues raised by EPA and allows flaring production up to 3%. Nevertheless, in 2017 flaring performance for the KNK FPSO has regularly exceeded Gh EPA limits for several months with two peaks in June and July 2017 (Figure 5.1).

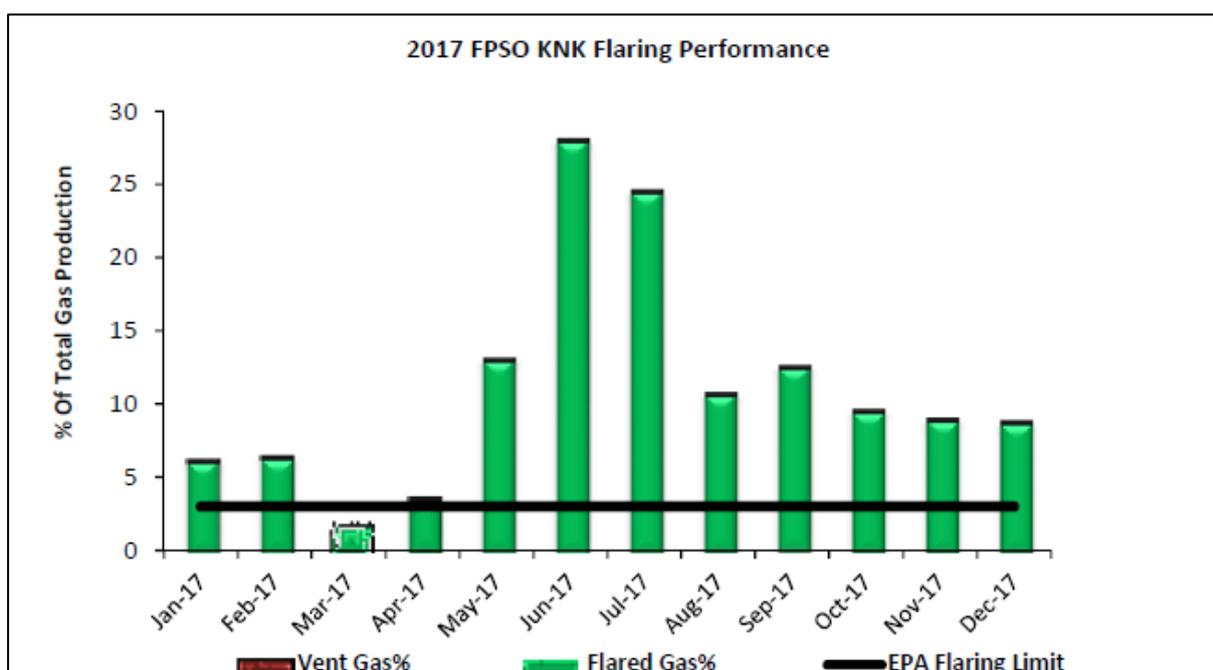


Figure 5.1: Jubilee Flaring Performance 2017

The flaring associated with the KNK FPSO in 2017 appears to be due to several process upsets and maintenance activities. Specifically, the highest amount of gas flared in June 2017 and in the following months was caused by a facility shutdown for the flare tip replacement, a temporary lack of gas reinjection capacity and the fluctuating demands in gas supply to GNGC resulting in stranded gas directed to flare. TGL notified Gh EPA about the shut down for the flare tip replacement. KNK FPSO is also experiencing several maintenance activities on board due to the accommodation upgrade and especially due to the Turret Remediation Project (TRP) which commenced in August 2017, which has required shutdown operations in several cases.

On the TEN FPSO, flaring was related to the commissioning phase of the FPSO, a total flaring limit of 48 mmscf/d of gas was allowed, whereas post commissioning phase the 3% limit of produced gas flared was applied (Figure 5.2).

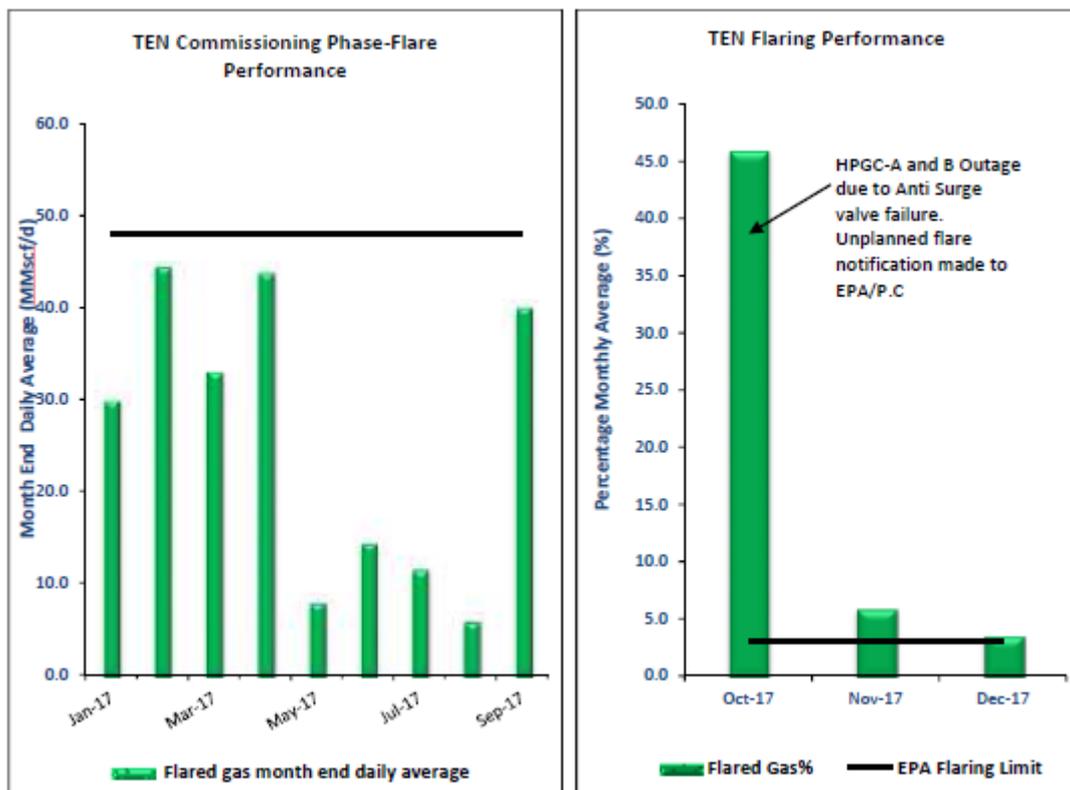


Figure 5.2: TEN Flaring Performance 2017

In December 2017, TGL developed the Flare and Vent Management Plan, with the aim to define the TGL management approach to associated gas from its operation in the Jubilee and TEN fields, which result in gas venting and flaring. The plan lists the scenarios when venting and flaring may occur and the preferred management options available to TGL in the event of routine and non-routine flaring. Although TGL reaction and explanation to the flaring issue is appreciated, the IESC would like to see a clear definition of what constitutes routine and non-routine flaring (as non-routine flaring seems to include both maintenance and upsets for which the EPA approval is granted). From the Flare and Vent management plan, it appears to the IESC that the Project flares a percentage of produced gas as routine (purge/base load flaring), which would not be in compliance with the EPA approval (which outlines no production flaring of produced gas). Additional information is required (see paragraph below). In addition, potential mitigation actions should be outlined in the Flare and Vent Management Plan and made applicable to both FPSO's when flaring rates constantly exceed the EPA limits.

From the 2017 provided, ongoing regular maintenance, breakdown and shutdown periods continue to result in high flaring rates which represent ongoing environmental and OHS issues. The IESC are concerned that in 2017, flaring rates were exceeded significantly on the KNK FPSO in 11 of the 12 months. The IESC would like to see the percentage of flared gas resulting from maintenance, breakdown, shutdown, upsets etc, communicated to the EPA (in the event of a planned flare), and the percentage of flared gas communicated to the EPA post flaring event for each month to attribute what can be considered as routine and non-routine flaring. The IESC would appreciate receiving TGL a month by month flaring data and attributability chart to determine trends for flaring, the amount of anticipated (known) flaring communicated to the EPA and the amount of unexpected flaring to determine whether TGL management plans and mitigations are likely to have any impact on these figures, or whether additional actions are required.

5.2.3.2 Ambient Air Quality Monitoring

Ambient Air Quality Monitoring is a requirement outlined in the EMP for both FPSOs and onshore facilities in order to evaluate the levels of NO_x, NO₂, SO₂ and VOCs. FPSOs. TGL conducted the 2017 Ambient Air Quality Monitoring Campaigns offshore and onshore for Sulphur Dioxide (SO₂), Nitrogen Dioxide (NO₂) and Ozone (O₃). The offshore campaign was performed onboard the two FPSO's of Jubilee and TEN fields from the 17th July 2017 to 25th

September 2017, while the onshore campaign was conducted on four coastal districts from the 28th March 2017 to the 16th May 2017.

Air quality measurements have been conducted through passive diffusion tubes, which after the exposure period were packaged and dispatched to Passam Laboratories responsible for the analysis. The captors located on the FPSO's were placed in the Outdoor Processing Area, Outdoor Turret Area, Indoor Gallery Area and Indoor Office Area. The results showed all concentrations were well below the WHO and Gh EPA limits for both FPSO's.

The Local Community Ambient Air Quality campaign was conducted at the following districts: Jomoro, Ellembelle, Nzema East, Ahanta West. The results of the measurements were evaluated according with Gh EPA and WHO air quality standards and are reported in the following table:

Table 5.4: Air Quality Community Monitoring Results 2017

DISTRICT	SAMPLIG LOCATION	CONCENTRATIONS [$\mu\text{g}/\text{m}^3$]			REMARKS
		Averages Values			
		SO ₂	NO ₂	O ₃	
Jomoro	New Town	2.1	2.1	16.1	ave<limit
	Half Assini	3.3	2.4	19.9	ave<limit
Ellembelle	Ankobra	2.6	6.0	11.9	ave<limit
	Atuabo	2.7	3.0	12.7	ave<limit
Nzema East	Lower Axim	3.9	4.6	18.6	ave<limit
	Upper Axim	3.9	5.0	18.9	ave<limit
Ahanta West	Cape-3-Points	2.2	1.1	22.8	ave<limit
	Upper Dixcove	3.3	4.0	13.2	ave<limit

The results indicate that the monthly mean concentrations of the three selected gases analyzed within the survey period were below the Gh EPA and WHO Air Quality. Therefore, the survey identified that ambient air quality in the coastal districts was not being impacted by offshore flaring from the FPSO's.

5.2.4 Chemical Management

During the visits conducted at the KNK FPSO, chemicals were correctly stored, Safety Data Sheets (SDS) presence observed and adequate secondary containment noted. No spills were evident on the FPSO and secondary containment and spill response material were located in the immediate vicinity. The existing on-board laboratory appeared to be organized and functional, however the dry area and the wet area are not separated. No new laboratory has been installed on the FPSO, even though the IESC have been told since 2016 that a new laboratory facility had been approved and was ready to be installed. The IESC suggests to install the new laboratory unit as soon as available and practicable in order to decrease potential exposure to OHS risks.

The Shore Base pipe yard and chemical storage areas were observed to be well organized. TGL, as indicated by the IESC during the past site visits, provided adequate secondary containment at the temporary lubricant barrels storage area. Nevertheless, as also observed in 2016, the pipe yard chemical storage area is still facing scarce space issues. Some chemicals are stored outside of the area equipped with concrete containment and, even though the chemicals placed outside do not pose serious hazardous risk and the area is paved and provided with the controlled drainage system, the IESC suggests keeping the chemicals within the boundaries of the hazardous material storage area. As reported by TGL, the scarcity of space at the chemicals storage area is mostly related to inventory control resulting in an over accumulation of some chemical supplies and materials.

The new area planned at the commercial port is still not available and it is under the responsibility of Ghana Port and Harbours Authority, therefore TGL transfer expected date to the new area is still not available.

However, the Project needs to ensure that the chemicals storage area is fit for purpose and the inventory and stocking of materials is adequately managed.

Due to time constraints, the IESC was not able to visit the Chemical Storage area at Takoradi Port. The area is now operated and managed by Nalco Champion and no issues have been reported beside the amount of dust released when cargo ships normally operate at the shared wharf unloading lime which poses a potential OHS issue

for the contractor. Reportedly, Nalco employees wear personal protective equipment and suspend their activities when lime unloading operations occur. The planned development of the new TGL area within the commercial port, with a new chemical storage area, should effectively address this issue.

5.2.5 Noise

For the period under review, noise samples on the KNK FPSO were taken in order to assess occupational health exposure for offshore workers. Reportedly, a new noise meter unit will be procured and in 2018, the OHS noise monitoring campaign will be carried out on both FPSO's. No issues have been reported and personnel on board are in compliance with hearing protection policy. The onshore environmental noise survey will be performed in 2018.

TGL shall clearly report in the AMR the results of the OHS noise monitoring campaign, as well as issue a MOC or a justification informing why the planned noise monitoring campaign both onshore and offshore have been not carried out as outlined in the EMPs.

5.2.6 Ecology

The TGL annual Marine Mammal Observation (MMO) programme remains in place. The trained crew of TGL's EHSS vessels (Gh Navigator, Pacific Porpoise, Pacific Phoenix and the Far Sitella and Pacific Raider) perform daily observations and record their sightings. In 2017 a seismic survey was conducted and although the activity has relevant impacts to marine mammals no cases of mortality was recorded within the survey period. Additionally, in 2017 no unusual behavioural trends of marine mammals around the offshore facilities have been recorded.

Regarding the marine avifauna sighting performed by the EHSS vessels, no unusual large congregation of birds at the FPSO's have been observed. During the site visit, the 2017 MMO report was currently under preparation and was yet to be submitted to the Gh EPA. TGL informed that the report does not contain any significant findings or issues. IESC will review the document during the next site visit.

5.3 HEALTH & SAFETY COMPONENTS

The main scope of the IESC review was to verify whether TGL and MODEC Safety Management Systems, enforced on Jubilee and TEN projects, continue to be fulfilled in compliance with the requirements set by the IFC PSs (2006) and, where applicable, record non-compliances and/or suggestions for improvements during the period under review.

Considering aspects such as the recent developments of the TRP on the KNK FPSO and the fact that the JEAM FPSO was inspected during the previous year's monitoring activities, the current site visit included an offshore visit to the Jubilee Project only. Nonetheless, the main aspects of the TEN Management System were also reviewed during the IESC visit, and are discussed in the following paragraphs.

In detail, during the site visit the IESC visited the following facilities:

- ✓ TGL headquarter in Accra;
- ✓ TGL shore base in Takoradi, including pipe yard and warehouse;
- ✓ KNK FPSO.

The IESC review has been carried out by checking relevant HS requirement related records collected for the period under review, including:

- ✓ HS Management;
- ✓ Process Safety Management;
- ✓ Incident and near miss recording, investigation and implementation of corrective actions;
- ✓ Competency Management and HS Training activities;
- ✓ Emergency Management including relevant drills and related training provisions;
- ✓ HS Performance Monitoring; and
- ✓ Management and Inspection of Safety and Environmental Critical Elements.

As already reported in previous reports, in February 2016 the KNK FPSO turret was found damaged resulting in the inability of the FPSO itself to weather vane as originally designed. The issue was initially tackled by adopting the following measures:

- ✓ tug boats were deployed to hold the KNK FPSO on a fixed heading;

- ✓ alternative offloading arrangements were established; and
- ✓ production and gas export continued under a Case to Operate (CTO 64) with a reduced weather envelope.

Additional risk mitigation measures were then implemented, including a bearing lock, installed in September 2016, to prevent further degradation of the bearing and, setting the FPSO on a temporarily spread moored, to avoid the continuous presence of tug boats. The so-called “Interim Spread Mooring Campaign” was completed in March 2017 accomplishing more than 23,000 man-hours offshore, with no recordable incidents.

In addition, TGL continued the development of the TRP aiming at identifying a feasible long term solution to address the bearing damage.

The solution identified and agreed by all JV Partners and the Government of Ghana is to lift the FPSO up on the turret area, through the installation of a complex system of jacks. This will allow to intervene on the damaged bearing, installing a new system that will enable the FPSO to rotate its bow towards the dominant environment (the direction where the largest waves are coming from) and then install a permanent mooring effectively converting the KNK FPSO to spread mooring in situ. As part of the TRP development, a construction support vessel (CSV Lancelot , comprising about 40 additional workers) arrived at Jubilee filed in November 2017. The construction support vessel is connected to the KNK FPSO through a magnetic gangway, which can be disconnected anytime oil offloading operations have to be performed, allowing it to be positioned at a safe distance from the KNK FPSO itself. The whole TRP process is expected to be completed by the end of 2018. At the time of the site visit, preparatory works were ongoing considering that the lifting of the KNK FPSO was scheduled to be undertaken during the shutdown period, foreseen by the end of May.

Another important intervention completed during the reporting period on the KNK FPSO was the replacement of the flare tip, which was thermally degraded and caused a High Potential Incidents (HIPO) (falling of a metal flake on the main deck) during the reporting period. These activities were performed and completed in June 2017 using a specialised air crew using a helicopter for the lifting operation.

Similar activities were performed also on the JEAM FPSO where, during a performance test, one of the Tulips of the HP flare tip assembly ejected like a projectile and came down free fall impacting some topsides structures. This HIPO dropped object incident required the facility to be shut down for 10-days shutdown to allow for the removal of the remaining tulips as a safety precaution before production could be resumed.

5.3.1 HS Management

The EHS Management Systems adopted for both Jubilee and TEN Development Projects remain adequate and effectively maintained for the control of all HS risks; however, a significant difference needs to be noted. Whilst the KNK FPSO is owned by TGL and MODEC act as O&M Contractor and therefore the EHS Management System reflects the structure of TGL Operations Framework, the JEAM FPSO is owned by MODEC which has implemented an EHS Management System based on MODEC corporate standards. TGL, as the TEN field operator is responsible only for assuring that the MODEC arrangements are adequate and that they meet or exceed the Tullow Corporate EHS requirements. Therefore, where identified gaps and/or support interfaces are required, TGL ensures that interface/bridging procedures are developed and integrated into the overall TEN EHS Management System. Evidence of these activities during the reporting period included the development of an Improvement Plan to enhance the control of work activities, the review of the TEN operational safety case (to align it to with Jubilee safety case), 5 audits performed by TGL on MODEC life-saving rules, as well as the revision and improvement of the PTW system to replicate the same system which is successfully implemented on the Jubilee/KNK FPSO.

Both FPSOs crews (which include MODEC and sub-contractors personnel) continue to be managed directly by MODEC. There are only a few TGL employees constantly on-board. During the site visit to the KNK FPSO, TGL personnel was limited to the Offshore Installation Manager (OIM) and a couple of other key positions.

Overall, the IESC continues to observe a strong TGL management commitment towards safety (summarized by the “safety before production before costs” approach), continuously confirmed during the site visit and via discussions with TGL employees and all their main contractors.

As further evidence of this commitment, the IESC was informed that an internal audit is being conducted to assess how effectively the Corporate Functions (the IMS) have embedded mandatory requirements across the group and how TGL requirements align with Group requirements. The results of this audit were not yet available at the time of the site visit even if they were expected to be available within the first quarter of 2018. As per the information available during the site visit, no major non-conformities are expected as an outcome of the audit. However, TGL stated that possible required actions will be implemented against an agreed timetable.

5.3.1.1 [Safety Inductions](#)

All TGL employees (including recently hired), contractors and visitors arriving at Tullow facilities are duly informed about health and safety precautions on site. Comprehensive induction slides are available and are clearly explained by skilled personnel. The IESC confirms this, having attended a complete and satisfactory general overview of all health, safety and environmental risks before starting its activities at TGL main office in Accra.

Before boarding the helicopters, employees are required to attend a specific safety induction to raise awareness on the hazards they might encounter during the trip offshore. People arriving on-board KNK FPSO (including visitors, such as the IESC) are informed about the ship characteristics and associated risk by means of an induction video, which is quite comprehensive and clearly addressing both occupational and major hazards, emergency situations, means of evacuation and all safety rules to which all personnel must comply to. Complementary to the video, the main FPSO areas were physically visited and introduced to the IESC as integral part of the safety induction.

The above basic inductions are effectively provided to all personnel (with no exclusion) upon arrival on-board the FPSOs and prior to any helicopter trip. The induction material has been modified over the years in favour of an improved completeness and takes into account relevant changes to the covered facilities.

5.3.1.2 [KNK FPSO Permit to Work and Isolation System](#)

A Permit to Work (PTW) and Isolation System is in place on-board KNK FPSO and it is considered to be an effective measure to ensure that hazardous operations (i.e. non-routine activities) are carried out in a safe, controlled and coordinated manner.

The system reflects the structure represented in the PTW procedure part of MODEC Management System. Such procedure clearly defines:

- ✓ roles and responsibilities;
- ✓ scope and applicability of the PTW and Isolation System;
- ✓ PTW issuing process (from hazard identification to final authorization);
- ✓ permits validity and handover;
- ✓ PTW Issuers required qualifications; and
- ✓ review and monitoring of PTW System, etc.

Mainly three types of work permits and two types of certificates are adopted: Hot Work Permit, Spark Potential Work Permit, Cold Work Permit, Confined Space Entry Certificate and Isolation Certificate. Additional certificates are issued in case of specific operations such as the override of safety and emergency systems. The permits are produced in triplicate copies to be kept at the permit office, central control room and at the worksite.

The Isolation Certificate is required when activities are to be performed on energized/pressurize equipment. It prescribes the use of specific tags, blinds and locks which have been found effectively adopted.

The system is periodically reviewed and audited by MODEC via a dedicated checklist to establish whether all aspect associated to the PTW are properly addressed (e.g. hazard identification, risk assessment, prescribed precautions, worksite preparation, etc.).

During the site visit, the IESC reviewed the established PTW process on-board the KNK FPSO, and confirm that the PTW incorporates a detailed description of the work to be carried out, including the identification of the hazards related to the operation and of safeguards to be implemented in order to minimise related risks.

During the KNK FPSO walkthrough, the IESC observed a range of barrier job boards outlining the PTW numbers and the job details/hazards related to particular ongoing activities. The IESC reviewed one work permit issued for an electrical intervention on the TRP area and questioned the operator regarding the procedures related to its issuance, use and presence of other copies on board. No gaps in the operator competency and in the certificate were identified.

5.3.1.3 [KNK FPSO Workplace conditions and Housekeeping](#)

The walkthrough on the KNK FPSO also enabled the IESC to verify the standards related to workplace conditions, housekeeping and hygiene enforced on-board.

The IESC observed that accommodation areas are generally kept clean and are well maintained. The accommodation upgrade plan, started in 2017, is still ongoing. The IESC had the chance to stay overnight and found the upgraded rooms satisfactory in terms of space, services and availability of emergency escape packs.

Regarding workplace conditions, outside working areas are found tidy, clean and kept in good condition. The KNK FPSO deck is organized and divided in modules. For each one of them, its specific hazards are clearly identified and mobile barriers are available in case the access have to be restricted during temporary activities (e.g. lifting operations). The IESC visited also the TRP area and found the construction site clearly restricted with physical barriers and access control.

A number of scaffoldings were under construction due to the forthcoming shutdown maintenance operations: each one of them, as well as their related access ladders, were properly assembled, marked and secured. Most of the materials were found to be properly identified, stored and stacked safely with sound packing and pallets.

A dedicated procedure for ensuring proper management, control and approval of hazardous substances is adopted by MODEC and found to be fairly effective. In fact, hazardous substances were observed suitably contained and appropriate hazard warning signs were clearly displayed where hazardous, harmful or toxic substances were present. Drums, barrels and tote-tanks on the upper deck were found to be equipped with secondary containment, which were found clean and free from any condensed water.

Material Safety Data Sheets (MSDS) are generally available for the chemicals currently stored or used. Specifically, MSDS are available – in dedicated and easily identifiable caseloads – at the place of storage such that immediate emergency advice is at hand and appropriate action can be taken. Emergency eye wash basins are also present and periodically checked.

The medical facility was found to be adequate and fully stocked with the necessary equipment and medicine to enable immediate first aid treatment in the event of injuries or minor medical problems. It is constantly staffed by an assigned medic who is also in charge of managing the drugs inventory and the employee medical records. Controlled drugs are kept in a dedicated locker accessible only by the medic.

Galley and food storage were found in a proper status, clean and well organized. Food supplies are delivered once a week via supply vessel and were found properly stored and labelled. Samples of potable waters are quarterly sampled from various outlets within the accommodation and engine rooms and sent onshore to be analysed. Results of the analysis confirms that the same meets with WHO and GSA guidelines.

5.3.1.4 [Accra TGL Office and Takoradi shore base Workplace conditions and Housekeeping](#)

As already mentioned, during the site visit, also Accra TGL Headquarter Office and Takoradi shore base/pipeyard were inspected.

For what concerns the former, the IESC observes that it showed high-level standards: all working environments where found clean, tidy, well lit, and air-conditioned. All workstations are set up to respect all standards regarding the ergonomics (type of chairs, desk height, screen positions, sources of light, etc) and supplied with high quality computer technology. Emergency routes, fire extinguishers and clear instructions regarding emergencies are present and clearly marked on every floor. The outside office yard (including the muster point location) was found tidy, clean and free of any obstacles.

Regarding Takoradi shore base and pipeyard, the latter was tidy, clean and in good condition as well. The IESC notes that, in the non-hazardous materials warehouse, each one of the stock shelves is clearly marked with its maximum admissible load and each corner has protection against accidental forklift hits.

Hazardous materials are stocked separately in a dedicated area with MSDS promptly available in specific and clearly marked racks. As previously mentioned in section 5.2.4, the IESC suggests keeping all hazardous materials within the dedicated containment basin to limit workers exposure in case of spills.

The IESC did observe a significant amount of lubricants stocked near to the fences of the pipeyard: each drum was found on dedicated secondary containments and capped to avoid the formation of stagnant water. The Company states that it is about to reduce the amount of this stock by improving its stocks and materials inventory management. However, it is suggested to set up a roofing for this stock, to prevent secondary containment filling with rain water (and subsequent increase of malaria risk) as well as to avoid direct sunlight exposure and overheating of the stocked drums.

5.3.1.5 [Personnel Protective Equipment](#)

The IESC observed that appropriate Personal Protective Equipment (PPE) was correctly worn by all operators on-board the KNK FPSO and the quality of PPE received by the survey team was in line with offshore standards. When outside the accommodation areas, all personnel are required to wear:

- ✓ safety helmet;
- ✓ steel toed safety shoes;

- ✓ long sleeved fire-retardant coveralls;
- ✓ eye and ear protections; and
- ✓ gloves.

Additional PPE are prescribed for specific tasks such as grinding, welding or works over water, etc.

During the inspection to Takoradi shore base and related pipeyard, the IESC noted that a strong awareness and commitment of TGL and contracted workers towards the importance of using the prescribed PPE on workplace. Not a single non-compliance was recorded during the inspections, therefore no concerns are expected from this specific aspect.

Due to time constraints related to bad weather, which delayed the flight back from KNK FPSO to Takoradi, the IESC did not have the chance to visit other onshore installations, such as Takoradi Harbour for cargo operations and the Baker Hughes warehouse (located close to the TGL jetty area).

However, through site interviews and considering the fact that the new TGL area within the commercial port (initially foreseen to be ready by the end of 2017) was not ready yet at the time of the site visit, we understood that the situation had not significantly changed during the last reporting period.

5.3.2 Process Safety Management

Management of process safety risks involves managing a number of technical (plant), managerial (processes) and human factor (people) activities which, if not managed effectively, could lead to a major incident.

The main aspect of process safety and management of major hazards are provided in the FPSOs Operations Safety Case. TGL has developed a specific safety case for each of the two FPSOs. The KNK/Jubilee safety case was revised and issued in October 2017, while the JEAM/TEN safety case was under revision during the visit and due to be issued in June 2018.

One of the main purposes of the safety case is to assess the risk associated to major accident events and to demonstrate that risk reduction measures implemented are sufficient to bring the risk to As Low As Reasonably Practicable (ALARP), i.e. further risk reduction is impracticable or the cost is grossly disproportionate to the improvement gained).

For both FPSOs, the risk was assessed as ALARP through a series of risk assessment studies concluded by ALARP demonstration workshops developed during the design phase and revised, where required, for the operations phase. The IESC positively observed TGL commitment to adopt the Safety Case as a learning document for the engineering and operations workforce.

Preparation of web-based version (e-safety case) was ongoing during the reporting period. This measure was found implemented for Jubilee and still under development for TEN.

In any case, offshore leadership and onshore operation and engineering support teams attended dedicated awareness and familiarization training sessions on this matter during the reporting period.

As stated in the 2017 AMR, TGL confirms that its process safety KPI for the year 2017 were achieved, also through Process Safety Management Improvement Plan delivery assured via internal audit by Tullow Group in conjunction with JV Partners. TGL confirms its strong commitment towards this aspect by planning further strengthening of the same improvement plan for 2018.

To monitor, evaluate and manage process safety risks on the FPSOs, TGL has developed a software package called *RiskPoynt*, based on the Swiss Cheese Model (or Barrier Model). The software allows TGL to assess the facility level of risk by providing in real-time the impairment status (i.e. effectiveness/availability of the barrier in case of incident) of the safety barriers. During the reported period, RiskPoynt had been successfully introduced and rolled out on both Jubilee and TEN Facilities.

Another key aspect for the management of process safety related risks is the identification, management and performance assurance of SCEs/ECEs. Relevant details related to SCEs/ECEs are provided in section 5.3.7.

5.3.3 Incident Investigation & Reporting

The IESC observed that all incidents and near misses are promptly recorded and analysed, on the basis of Tullow Incident Reporting, Investigation and Analysis (IRIA) Procedure which requires that all incidents are reported within the TGL web based incident reporting system (EMEX) within 24 hours of any incident.

It is worth mentioning that TGL classifies the incidents into three categories:

- ✓ incidents occurred in Controlled Activity or Site - these incidents are reported in EMEX and contribute to Tullow's EHS Statistics;
- ✓ incidents occurred in Monitored Activity or Site - these incidents might be reported in EMEX only when they provide learning for TGL but do contribute to Tullow's EHS Statistics;
- ✓ incidents occurred in Uncontrolled Activity or Site - these incidents are not reported and do not contribute to Tullow's EHS Statistics.

During 2017, MODEC continued to record incidents and injuries which were then uploaded in the EMEX EHS system. As outlined in the AMR, and verified by IESC, a total of 132 work related incidents were reported for the reported period (relating to all TGL Controlled Activities/Sites). Out of these 132 incidents recorded:

- ✓ 20 were injuries (4 of them resulted in LTI);
- ✓ 94 were near misses;
- ✓ 17 were environmental incidents;
- ✓ 1 was one occupational illness;
- ✓ 1 was a security case.

No Tier 1 Process Safety Incidents occurred. A Tier 1 Process Safety Incident is an unplanned or uncontrolled release of any material from a process that results in one or more of the consequences listed below:

- ✓ harm to people;
- ✓ impact upon the community;
- ✓ damage to equipment; or
- ✓ a release of a threshold quantity.

IESC is pleased to note that all incidents are investigated regardless of their severity level. Incidents that could have realistically resulted in a major or catastrophic outcome are classified as HIPO. A detailed investigation is required for these incidents in order to identify appropriate measures to prevent their recurrence. For the reporting period, a total of 5 potential HIPO incidents were recorded.

Of the potential HIPOs registered for the Project, 4 of them happened offshore (in detail, all of them on the JEAM FPSO) and one (1) at Takoradi onshore base / pipeyard which was – at the same time – an LTI (finger crushed by dropping of a tensioning rod from low height). The IESC has reviewed the related incident investigation report for this LTI and found it adequate and well-structured, clearly identifying, in its contents:

- ✓ incident Background and Description, Classification & Severity Rating;
- ✓ composition of Investigation Team;
- ✓ investigation Findings and Sequence of Events;
- ✓ incidents immediate and root causes;
- ✓ supporting documentation such as photographs, drawings, witness statements and other evidences collected; and
- ✓ corrective action with Responsible Person and Deadline for implementation.

The IESC reviewed the proposed actions and consider them as adequate to address the observed issues to avoid incident recurrence.

The other three (3) LTIs were related to offshore activities and consisted of two slips and falls from ladders on the JEAM FPSO and one finger injury on the KNK FPSO. Since then, TGL promptly initiated a Safety Improvement Plan for MODEC to further improve its safety performance. The results were significant since no other LTIs were recorded in offshore operations during the last five months of 2017.

The last Incident Reporting, Investigation and Analysis Procedure issued in July 2016, which is still in force, prescribes that all major incidents (actual level 4 and 5 incidents according to TGL classification) shall be communicated to IFC within 3 days by e-mail and annually as part of annual IFC report. The above prescription is valid for controlled sites/ activities, monitored and uncontrolled activities or sites.

5.3.4 Competency Management & Training Activities

In the period under review TGL has carried out extensive training across a range of EHS topics, for both onshore and offshore personnel, including:

- ✓ Advanced Process Risk Assessment and Process Safety Management awareness training, delivered by the “Prime Quality Training” in Accra and attended by three delegates from TGL;
- ✓ awareness and familiarisation training for the new revision of Jubilee/KNK and TEN/JEAM Safety Cases;
- ✓ extension for 2017 of Hazard Awareness, Task Risk Assessment, Permit to Work and Control of hazardous substances (COSHH) trainings (provided by an external third party) for both JEAM and KNK FPSOs personnel;
- ✓ dropped object prevention training was organised for employees and contractors in Takoradi;
- ✓ defensive driving training:
 - targeted training (PTW, Inductions, Emergency Response, Risk and Hazard Awareness) of project personnel prior to offshore mobilisation in support of Shutdown, TRP and IEP projects on KNK FPSO,
 - first aid training was undertaken by employees from the Accra office. This training was carried out by West African Rescue Association (WARA) Training Academy. This is part of the medical emergency response plan for all TGL offices. As per data available, Basic first aid training was attended by 47 TGL employee plus 96 contractors’ employees, while the Advanced first aid training was attended by 6 TGL employees. All TGL employees in Takoradi are similarly trained in first aid and undertake annual refresher training,
 - malaria awareness, IMO Level 3 Oil Spill response, working at height and hazard recognition trainings for employees working on Takoradi Logistics Supply Base and Sekondi Fabrication Yard,
 - malaria online awareness training for all TGL staff.

Details regarding other trainings organized by TGL as well as number of attendance/contents of the trainings are fully described in the AMR.

It is IESC understanding that TGL training programs are limited to TGL’s employees with the exclusion of specific topics such as Oil Spill Response or Process Safety which are extended to MODEC’s employees, subcontractors and concerned authorities. TGL ensure competency of MODEC or other contractor employees, via specific audits that include contractors training programs. In addition, for both FPSOs, safety critical roles are identified (OIM, HLO, etc.). MODEC have to provide evidence to TGL of the competency of those safety critical employees through specific KPIs.

During the site visit, the IESC reviewed MODEC’s KNK FPSO training matrix for 2017, which outlines a comprehensive HS training program undertaken which includes PTW, Task Risk Assessment, Confined Space Entry, Advanced Firefighting, COSHH, Risk Assessment, etc..

5.3.5 Emergency Management

As per previous IESC inspections, strong emergency procedures on-board KNK FPSO continue to be implemented, including clearly identified emergency escape routes and clearly identifiable muster points. All these areas were kept free of obstructions at all times. Limits of PPE free areas are clearly marked outside the accommodation areas.

In case of emergency, the KNK FPSO accommodation has been designated as the Temporary Refuge (TR) with the Central Control Room (CCR) and Mess Room designated as the location where personnel muster and incident response is coordinated from.

Generally, firefighting systems, fire & gas detection systems and emergency evacuation systems (such as escape routes, Fast Rescue Craft, lifeboats and life rafts, etc.) on-board the KNK FPSO were found in good status, well maintained and regularly inspected. As highlighted in the AMR, fire extinguishers and fire protection systems underwent systematic weekly and monthly inspections through the MAXIMO system (defined in chapter 5.3.7) The IESC inspected a number of fire extinguishers on board the KNK FPSO and did not find any non-compliances regarding the application of the abovementioned procedure.

Lifejackets for at least 100% lifeboat capacity are provided and stored in glass fibre boxes near the lifeboat/liferaft embarkation areas. Additional lifejackets are stowed in cabins and additional designated locations.

On-board KNK FPSO, emergency drills are regularly performed according to a planned schedule. Emergency drill records (developed by MODEC) continue to be considered adequate and well-structured providing (among others):

- ✓ simulated emergency scenario (fire, spill, man overboard, etc.);

- ✓ type of alarm activated (either general of abandon ship);
- ✓ date and time of the drill;
- ✓ POB list with indication of missing persons (if any);
- ✓ sequence of events;
- ✓ muster time and evacuation response;
- ✓ main findings/observation; and
- ✓ action to be taken and responsible party for implementation.

As highlighted in the AMR, a total number of fourteen (14) fire drills were conducted in the reported period, against a mandatory frequency of three per year. On the other hand, emergency exercises address a variety of potential EHS emergency situations. TGL continues on this challenging goal of trying to be self-sufficient and prepared to respond (in the event of a major incident/catastrophe) by using their own resources and response capabilities.

With regard to Oil Spill Response, TGL has developed comprehensive Oil Spill Contingency Plans (OSCP) for TEN and Jubilee Fields also covering oil spills occurring in Takoradi Commercial Port and Sekondi Naval Base. OSCP's are based on a spill risk assessment, defining expected frequency of occurrence and magnitude of spills from different release sources and oil spill trajectory modelling with oil fate and environmental prediction for a number of spill simulations, using a computer model with the ability to input local current and wind data.

In March 2017, TGL in collaboration with the Gh EPA and other Government Agencies carried out a major oil spill exercise (Tier 3) to test TGL Tier 1 & 2 level of response and preparedness until arrival of international support. The exercise, which simulated an accidental release of crude oil from KNK FPSO during oil offloading operations, was successfully carried out. No major gaps were identified. All relevant details are reported in the 2017 AMR.

IMO Level III Oil Spill Response and Environmental Impact Assessment trainings are periodically provided for a range of TGL employees and contractors. Moreover, TGL organized a series of offshore oil spill response training exercises through the external contractor Oil Spill Response Limited (OSRL), to further improve oil spill awareness and capability for both in house and external 3rd party contractors.

During the site visit to the onshore base in Takoradi, the IESC was pleased to note a consistent number of new equipment (such as booms, pumps, skimmers, adsorbent materials, other special vehicles) tidily and properly stocked, ready to be deployed in case of major oil spills offshore.

For what concerns compliance with national reporting requirements, TGL regularly submits monthly HSSE reports to the Petroleum Commission of Ghana (PC). These reports, submitted in a format agreed by the PC itself, include specific sections related to HS issues, fire and safety drills and emergency response exercises. According to TGL, no comments nor requests for corrective actions were submitted by the PC during the period under scrutiny.

5.3.6 HS Performance Monitoring

Regarding the health and safety index analysis, a total of 133 work related incidents have been recorded for the 2017 reporting period in TGL "controlled" site or activities. Even if the total number of incidents slightly decreased compared to the value recorded in 2016, 4 LTIs have occurred (3 of them offshore), while no Tier 1 Process Safety Incidents were recorded.

Given the above, 2017 TGL LTI Frequency (LTIF) rate stood at 0.79, which is above the overall 2016 IOGP LTIF average (0.27) and significantly higher than 2016 TGL LTIF of 0.00. TGL Total Recordable Injury Frequency (TRIF) rate slightly increased as well, when compared to 2016 figures and stood at 1.38, not meeting the overall 2016 IOGP TRIF average (used as the TGL benchmark) nor the TGL set target (0.89). Further details of these two indicators' performance in relation to TGL and IOGP benchmark targets during the last years could be found in the AMR.

On-board KNK FPSO, the IESC notes that a series of leading and lagging indicators are constantly monitored. These include (among others):

- ✓ EHS meetings;
- ✓ senior leadership walkthroughs;
- ✓ EHS Action Items Opened and Closed;
- ✓ security, environmental and asset damage incidents;
- ✓ safety observations; and
- ✓ EHS Audits as per schedule, etc.

On the other hand, TGL HS auditing program continues to be effectively implemented in accordance with Company procedures at TGL and MODEC levels. During 2017, a range of internal and external EHS audits were undertaken on the both onshore and offshore facilities covering a wide range of topics such as:

- ✓ Health & Hygiene audits;
- ✓ Environmental Management System Audits;
- ✓ Assurance audit of HIPO action closure;
- ✓ Assurance audit of offshore safety improvement initiatives;
- ✓ Pre Shutdown readiness review audit;
- ✓ Process Safety Management audit;
- ✓ Lifting operations audit;
- ✓ Environmental audit; and
- ✓ Periodic Senior leadership walkthroughs, etc.

5.3.7 SCEs/ECEs Management

As already mentioned in previous IESC monitoring reports, the Management Systems implemented on both FPSOs include the identification and management of Safety and Environmental Critical Elements (SCEs/ECEs), which are defined as any part of the installation, plant or equipment and computer programmes whose failure will either cause or contribute to a major accident hazard, or the purpose of which is to prevent or limit the effect or occurrence of a major accident.

SCEs/ECEs identification and management is performed according to the OSCR (Offshore Safety Case Regulation 2005), which includes the following key features:

- ✓ concept of duty holder;
- ✓ safety case;
- ✓ identification of major accident hazards;
- ✓ identification of SCEs/ECEs;
- ✓ setting of performance standards for SCEs/ECEs;
- ✓ written schemes of verification and examination; and
- ✓ independent verification requirements.

The OSCR is not only a UK legal standard, but now used worldwide serving as a good practice example.

In October 2017, TGL has issued an updated revision of the Jubilee Operations Safety Case (TGJ-OPS-SFC-00-0001-001 Rev. 4) to address the changes made on-board KNK FPSO (including the new mooring lines installed as a result of the failed turret bearings), whereas TEN Operations Safety Case (00002-E80- ES- 0002 Rev. 1), currently under review and due to be issued June 2018 intended to be aligned to the Jubilee safety case content and structure.

Both documents have been made accessible to relevant onshore and offshore personnel and the roll-out process was supported by awareness and familiarization training.

The OSCR requires that a Duty Holder (i.e. TGL) ensures that a record of the SCEs/ECEs is made and maintained. The regulation further requires the duty holder to ensure that this record be commented on by an Independent Verification Body (IVB), and that a verification scheme is drawn up by, or in consultation with, the IVB. The purpose of the scheme is to ensure that the identified SCEs/ECEs are suitable throughout the entire life cycle of the installation. Verification is achieved by developing a scheme detailing verification activities, including design review, witness of testing, examination and audit which demonstrate that SCEs/ECEs parts of the asset are suitable.

With regard to the TEN FPSO and subsea facilities, the initial suitability of SCEs/ECEs has been verified by Bureau Veritas UK Limited, which has developed initial suitability schemes and recorded in Detailed Work Instructions (DWIs) of the tasks to be performed by the IVB to confirm the SCEs/ECEs are initially suitable in terms of Functionality, Availability, Reliability or Survivability.

With regard to Jubilee FPSO, the initial suitability verification of the SCEs/ECEs did not include an Independent Verification. However, TGL plans to appoint an IVB, for the verification of SCEs/ECEs suitability throughout the life cycle of both TEN and Jubilee Development Projects, by July 2018.

To ensure the integrity of its assets, TGL continues to implement an inspection/maintenance program by systematically using, for both FPSOs, a Computerized Maintenance Management System (MAXIMO).

The MAXIMO system, which became operational for both TEN and Jubilee in 2016, allows the maintenance/inspection team to effectively track the tasks to be carried out and to keep records and plan future activities.

The IESC observed that the CMMS covers inspection and maintenance activities of all identified SCEs/ECEs and allowed TGL the attainment of specific Process safety KPIs (such as Safety Critical Maintenance Plan) during the period under scrutiny.

5.4 SOCIAL COMPONENTS

5.4.1 TGL Social Performance Strategy

TGL SP strategy is realized through programmes which continue to be funded through the Jubilee and TEN Partners budget (35.5% and 47.2% contribution from TGL respectively) and TGL discretionary budget (100% TGL). They are implemented in the Project impacted communities, namely the six coastal districts of Jomoro, Ellembelle, Nzema East, Ahanta West, Sekondi Takoradi Metropolis and Shama districts.

The SP programmes are focused on the following key areas of intervention:

- ✓ socio-economic activities, which fall under the so-called *Socio-economic Investment (SEI) Strategy* (funded through TGL discretionary budget, following the approval of Tullow Group);
- ✓ *impact (fisheries) management* (funded jointly by Jubilee and TEN Partners);
- ✓ *stakeholder engagement* (funded jointly by Jubilee and TEN Partners).

The *SEI Strategy*, whose implementation started in 2017, has been recently fine-tuned and it is now focused on:

- ✓ building capacity through education in Science, Technology, Engineering and Mathematics (STEM) subjects;
- ✓ projects which strengthen the local and national economy;
- ✓ developing shared infrastructure by adapting and leveraging TGL's infrastructure plans and projects to benefit host communities.

The SEI Strategy supports the development of STEM from kindergarten to the university level, with the purpose to foster the growth of science talents and skills in the country. Specifically, the Strategy is implemented through the following initiatives: "Sustainable Kindergartens", "Innovate to Educate Programme", "Right to Dream Foundation", "Strategic STEM Support at Second Cycle Institutions" and "STEM Scholarships".

Impact management projects are initiatives designed to help mitigate the impact of TGL operations and thus address coastal communities. The initiatives include:

- ✓ Livelihood Diversification and Support Project (LDSP): it addresses fishing communities affected by the general decline of fish catch and Project impacts with the purpose to provide them with alternate sources of income to supplement their earnings. The supported activities are progressing well and thus the JV partners intend to continue with their implementations also in the future;
- ✓ the TEN-Wins and Community Environmental Management Project: the TEN Wins programme was initiated to strengthen health and hygiene education in basic school and was later extended to include the coastal communities of the Western Region on environmental management practices, climate change and environmental sanitation. The beneficiary communities were selected based on the oil spill modelling and the sensitivity maps developed for oil spill management for the TEN and Jubilee fields. The project will ensure that sensitive areas along the coast are always kept clean;
- ✓ Road Safety Campaign ("Safe Lives on the Road Saves Business"): the activity consists in a road safety campaign aimed at enhancing road safety consciousness within TGL impacted communities through training, workshops, demonstration and games. The project was developed in partnership with the National Road Safety Commission;
- ✓ Fishermen Sea Access: three FPSOs are located offshore of the Ghanaian coast (two for TGL and one for ENI) and offshore exploration activities are conducted by different operators. Therefore, the management of fishermen sea access remains a challenging issue both at Company and Government level. TGL is focused on ensuring safety and preventing incursions into the Exclusion Zone (EZ) and Advisory Zone (AZ) and refers to the Government for the identification of alternative solutions to face the problem, as better explained in

Section 5.4.4. The JV Partners commissioned in 2017 the development of a “Sea Access Framework” with the following objectives:

- to collate the existing strategies aimed at addressing AZ and EZ conflicts and the results achieved so far,
- to engage key stakeholders in reviewing these existing strategies to identify the necessary gaps and opportunities, and
- to recommend and formulate strategies that could potentially reduce further encroachment of fishermen into the AZ and EZ.

The process has been handed over to the PC in order to make it an industry-wide concern. The report should be issued by the end of May 2018 and should contain actions to improve the management of sea access. These steps represent an important sign of a growing institutional consciousness of offshore cumulative impacts. Reportedly, the Government is also working to set up a forum to bring together all O&G operators in the country.

Details on the management of the AZ and EZ are provided in paragraph 5.4.4.

For information on *stakeholder engagement activities* please see paragraph 5.4.2.

The reference documents for TGL social activities have not undergone changes in the last reporting period (2013-2014 Social Investment Strategy, the Monitoring & Evaluation Plan and the Public Consultation and Disclosure Plan, PCDP).

The SP strategy is aligned with the IMS but not an integral part of it. IESC understands that the reason is the fact that such a structured social component is a peculiarity only for TGL within Tullow Group: TGL is the only business unit which is a field operator and thus has specific needs and responsibilities with regard to the social context in which it operates. A high level of independency is ensured from the Group.

Finally, collaboration with the other JV partners in the field of SP is an ongoing process. The JV SP Unit Operating Committee meets quarterly to discuss modalities for the use of the SP budget and to coordinate social investments.

5.4.2 Community Engagement/Consultation and Disclosure

Community engagement continues at a good standard. It is evident that communities are well informed on TGL activities, engagement is continuous and developed using culturally appropriate tools. Engagement involves the six coastal communities impacted by the Project and includes, besides communities, interactions and dialogue with the local Chiefs and Elders, NGOs, Community Based Organizations, District Assemblies, Regulatory Agencies, Fishermen Associations, Fishmongers, queen mothers, Government security agencies and representatives of the business community. In addition, also in 2017 considerable effort was made to engage with deep-sea fishermen and the canoe council executives to continue to educate them on the FPSOs EZ and AZ and on the seismic campaigns. Reportedly, the focus of education activities and engagement in 2018 will change to drilling risks and restrictions due to the commence of the drilling program. Furthermore, TGL became aware of the need to invest more efforts to engage also with canoe owners, as they are generally different from the fishermen (often women) and thus are less sensitive on fishing restrictions (in particular with reference to AZ and EZ). The main step undertaken to allow their engagement was their identification: a data collection and validation exercise led and implemented by the Fisheries Commission begun at the end of 2017 with the purpose of regulating fishing in the country. The exercise targeted so far 450 canoe owners from the five major landing beaches of Axim and will be later extended to the other coastal communities. The data collected included: names of canoe owners, national ID details, passport pictures, embossment details, canoe details, origin-hometown, landing beach, type and categories of fishing, age of canoe and fishing gears, contact numbers etc. Conclusion of the registration exercise is expected by the third quarter of 2018. The information collected will become part of TGL database (*Borealis*, see paragraph below) to allow the Company to better target its stakeholder engagement activities, facilitate the process of grievance resolution (see section 5.4.4), and guide the selection of beneficiaries for the 2018 LDSP.

As mentioned in the former paragraph, no further update has been done to the PCDP following the 2015 revision. In view of the changes in the engagement strategy, IESC recommends reflecting these modifications also in the PCDP (including formal reference to the TEN Project).

In 2017 Tullow Group purchased “*Borealis*”, a stakeholder engagement software, in order to improve the tracking system of all social activities as well as to manage data generated by the engagement activities themselves. The software is coming into use: user trainings have been delivered to the SP team (including CLOs) and the team is in the process of including in the software all available data.

As already pointed out in the past site visit, the TGL website is still not used sufficiently by the Company to disclose Project updated information on social management. Therefore, IESC reiterate its suggestion to consider the disclosure on TGL website of PCDP, TEN NTS, main Project milestones in the field of community engagement in order to reach other possibly interested stakeholders and give more visibility to TGL efforts. IESC suggests also disclosing on the Company website the outcomes of the community ambient air quality study undertaken in 2017, which confirmed that the ambient air quality of the coastal districts is not being impacted by offshore flaring. These actions are particularly important not only to ensure transparency towards stakeholders but also to demonstrate the sustainability of TGL operations concerning air quality. This is particularly relevant now that new players of the O&G sector have started activities in the same AoI.

5.4.3 Grievance Management

In 2017 TGL has collected five grievances against the three reported in 2016: four were related to damages to fishermen equipment caused during the seismic campaign and the remaining one was from third party contractor who delivered the Clean Water Project. All four grievances related to canoe interaction were amicably resolved and closed while the outstanding complaint was carried to 2018 for amicable solution (still pending at the time of the site visit). IESC noticed that the resolution of grievances exceeds the timeline defined by the grievance process (from two to eight months compared to the 30 days foreseen in the PCDP). It is understood that the main reasons for the delay are:

- ✓ the necessary involvement of several stakeholders (chief Fisherman/Landing beach Committee and Canoe Council/Fisheries Commission) to assist with investigation and follow-ups;
- ✓ lack of reliable data for canoe owners identification;
- ✓ internal steps to be conducted within different TGL departments (i.e. SP Team, legal department, financial department).

Even if none of the impacted canoe owners denounces problems in the reimbursement of the suffered damage, they claim for compensation for the fishermen time lost during the long grievance resolution period (they state that the canoe crew cannot fish until the damaged equipment is reimbursed and replaced). TGL informed that in general compensation paid is higher than the actual market value of the damaged component, which can be considered as a sort of reimbursement for the time loss. IESC opines that in case of long delays, this amount might not be sufficient to cover the non-working period. Furthermore, based on the interviews conducted during the site visit, IESC understood that fishermen do not perceive this increased amount as a compensation for the time loss but only for the damaged equipment; additionally, it appears that in general, TGL interactions with canoe owners and fishermen are characterized by a general lack of transparency from the fishermen side. Based on all these aspects, this issue remains challenging. IESC and TGL discussed during the site visit about possible alternative solutions, which might be adopted to cope with this problem (i.e. renting fishing equipment during the grievance resolution period; clearly stating in the reimbursement documentation the items included to give more visibility to the additional amount provided besides the cost of the damaged equipment). Nonetheless, TGL should do everything in its power to shorten the duration of the grievance resolution process in order to reduce the impacts on fishermen livelihood and at the same time save resources. The canoe owner identification exercise which is currently ongoing (see section 5.4.2) goes in this direction, as it will allow saving time during the identification of the actual beneficiaries entitled for compensation. Besides that, TGL should push all the departments involved in the grievance resolution process to speed up the completion of the steps under their responsibility, bearing in mind that the closure of grievances is among the Company priorities.

5.4.4 Exclusion Zone Management

The management of the EZ and AZ remains the main issue that TGL Project has to face with regards to social performance. The trend of canoe incursions in the past years varied considerably: despite the stabilization in the number of incursions in 2014 and 2015, a new peak was recorded in 2016 as the effect of the arrival of the JEAM FPSO. For 2017 TGL reports a reduction of canoe incursions in the EZ but an increase in the AZ. The recent trend is the result of a new prevention strategy adopted by TGL: EHSS vessels constantly monitor the safety exclusion zones of both FPSOs but the adoption of weather forecasting software and the introduction of performance management target for the vessels coordinators was particularly successful in further preventing incursions. IESC acknowledges the constant collaboration between the Asset Protection team and the SP team and the big effort done in tracking on a daily basis and regularly analysing all incursions.

As anticipated in section 5.4.1, TGL is committed in mitigating Project impacts on fishermen, ensuring safety and enforcing law in the security zone. No alternative options have been explored to reduce the number of canoe incursions as suggested by IESC in the past, even if an important contribution in this sense is given through the

LDSP. Nonetheless, IESC observes that TGL managed to bring the issue of Sea Access in the Government agenda, which is committed through several initiatives to find new industry-wide solutions to the problem.

Finally, it is important to mention the SP Induction for Navy Deployment developed by TGL: it consists in a training session addressed to the Navy patrols on-board of the service vessels aimed at raising awareness on proper behaviour when approaching fishermen in the AZ/EZ in compliance with the Voluntary Principles on Security and Human Rights.

5.4.4.1 [Monitoring](#)

A Monitoring and Evaluation Plan was prepared in 2014 and no changes have been made to date. IESC opines that the plan is probably not in use anymore. Reportedly, the contractors' agreements for the implementation of the SEI and Impact Management projects include monitoring plans based on KPIs. Contractors have to regularly provide the SP team data for review on the achievement of the KPI. Being financed by Tullow group, results of SEI projects are also shared and analysed at Tullow the corporate level.

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