



Tullow Ghana Ltd Accra, Ghana

Independent External Monitoring Group

GHANA Site Visit: May 2019

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Description	Final Issue
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Controlled by	B. Grosso
Approved by	E. Napoli
Date	21 June 2019

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ABBREVIATIONS AND ACRONYMS

ALARP	As Low As Reasonably Practicable
AMR	Annual Monitoring Report
AP	Asset Protection
AZ	Advisory Zone
BULT	Business Unit Leadership Team
CLO	Community Liaison Officer
CMP	Corrosion Management Plan
EAP	Environmental Action Plan
EHSAP	EHS and Asset Protection
EMP	Environmental Management Plan
E.Mon.P	Environmental Monitoring Plan
EPA	Environmental Protection Agency
ESAP	Environmental and Social Action Plan
ESIA	Environmental And Social Impact Assessment
ESMS	Environmental And Social Management System
EZ	Exclusion Zone
FPSO	Floating Production, Storage and Offloading
GMA	Ghana Maritime Authority
Gh EPA	Ghana Environmental Protection Agency
GHG	Greenhouse Gases
GNCFC	Ghana National Canoe Fishermen Council
GNGC	Ghana National Gas Company
GTG	Gas Turbine Generators
HIPO	High Potential Incidents
HR	Human Resources
HS	Health Safety
IESC	Independent Environmental and Social Consultant
IFC	International Finance Corporation
IMR	Inspection Maintenance and Repair
IMS	Integrated Management System
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)
KPI	Key Performance Indicator
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

O&BE	Operational and Business Excellence (program)
OOC	Oil on Cuttings
OIW	Oil in Water
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
RBA	Risk Based Assessment
RBI	Risk Based Inspection
RWDC	Restricted Work Day Case
SCEs/ECEs	Safety and Environmental Critical Elements
SEI	Socio-Economic Investment
SP	Social Performance
STEM	Science, Technology, Engineering and Mathematics
TEN	Tweneboa, Enyenra, Ntomme
TGL	Tullow Ghana Limited
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.

In late 2018 TGL resumed drilling operation in both Jubilee and TEN, using two drilling rigs, Maersk Venturer and Stena Forth.

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 2019, relevant to the 2018 monitoring period and up to the time of the site visit.

The IESC site visit included the TGL headquarters in Accra and Takoradi, the Maersk Venturer drilling rig, the onshore TGL shore base in Takoradi, visit to Axim Fishing Community and meeting with fishermen representatives.

At the time of the 2019 independent external verification, all actions foreseen by the ESAP (dated April 2014) 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.

TGL Integrated Management System (IMS) continues to be fully operational and sets all the mandatory policies, standards and controls required to ensure TGL activities and associated risks are managed. In 2018, TGL continued working to simplify the Safety and Sustainability content within the IMS incorporating feedback received from the business as well as results of audits.

Good management of Project personnel is acknowledged and only one grievance was raised in the reporting period. In the second half of 2018, TGL launched the Operational and Business Excellence (O&BE) program aimed at identifying company performance improvements. The first phase led to a restructuring in the business based on a wide consultative process, which led to about twenty-four employees made redundant.

TGL management, the Business Unit Leadership team (BULT), did not change from the past year with the exception of the new Social Performance (SP) & Public Affairs Manager. The former manager left the company and was replaced by an internal permanent staff of the SP team. IESC welcomes the appointment of a former SP Advisor, as this ensures continuity with social activities and with the SP staff. Nonetheless, his position as SP Advisor remained vacant and now the SP team includes only three SP Advisors. IESC noticed that the SP team is overcommitted and this might impact the quality of the work done and the capacity to cover all activities. This is particularly relevant in view of the expansion of activities as a consequence of the additional SP budget allocated

for 2019. TGL should consider adding at least a new member to the SP team and, at the same time, improve efficiency in the management of SP documentation and data (making the most of the Borealis software already in-house), which was noticed to be particularly time-consuming. As a result of the O&BE program, the number of CLOs was reduced to three but, compared to the past, their role was much more integrated into the SP team, in particular with new monitoring and reporting responsibilities. In the past reporting years, TGL working relationship with the CLOs has been challenging. Improvements in their salary but TGL should ensure continues monitoring their working conditions to avoid an escalation of problems, as acknowledgment of the important role they cover.

In continuity with what done in the previous reporting periods, a wide range of Environmental, Health and Safety (EHS) training courses were provided in 2018, covering a wide range of topics.

Environmental monitoring actions continue to be carried out. In the reporting period, the previously established Environmental Management Plans (EMPs) remained in place and the monitoring requirements are still undertaken according to the TGL Monitoring Plan. The EMP, which is the main document providing guidance on the environmental management framework for both Jubilee and TEN, has been updated in June 2018 and will remain valid in its current revision foreseen in June 2020. The updated version includes an Environmental Action Plan that presents specific environmental action programmes addressing existing identified environmental problems, in order to ensure operational environmental performance is achieving regulatory compliance and good practice standards. The main environmental plans that are subsidiary to the EMP include management and monitoring requirements also for the Jubilee and TEN projects.

TGL ongoing activities on the FPSO's production and operations logistical support, including the chemical facilities, are covered by the 3-year Jubilee Field Production Operations Environmental Certificate (valid until 2021) and the TEN 3-year Environmental Certificate (valid until 2020).

Flaring for both FPSOs in 2018 exceeded Gh EPA limits for a number of months. High flaring rates attributed mostly to numerous process upsets and maintenance activities onboard the KNK FPSO. All flaring events associated with planned maintenance activities were notified and 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. The aforementioned Environmental Action Plan includes a FPSO flaring minimization programme with a dedicated budget of 3,000,000 UDS. The IESC understands that production flaring remains a constant issue of the project also due to the technical limitation of the FPSO especially KNK. Additional details have been requested by the IESC regarding the allocation of the budget dedicated to Flaring Minimization. Additionally, 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.

Regarding Health and Safety (HS) management, the current site visit once again confirmed TGL high level of consideration towards this aspect. This was evident during all the site interviews and discussions held by the IESC with TGL as well as drilling rigs contractors employees, which were found skilled, experienced, well trained and fully aware of their duties and responsibilities within the Projects' organizational structure. TGL remarkable HS commitment was also evident in all visited Project facilities (both onshore and offshore).

The HS Management System adopted (part of TGL IMS) and enforced on both Jubilee and TEN Projects is still considered as adequate to control and manage all identified major risks which could pose a threat to both people's health as well as to the integrity of the assets. This management system is rightfully considered by TGL as a "living document" which is constantly kept updated in order to reflect the actual status of Jubilee/ TEN Projects' and therefore to deal with possible new potential HS risks which could be identified during their development. Tangible of evidence of these updating activities performed during the reporting period were the revision of TEN Safety Case, the continuous implementation of the Process Safety Management Improvement Plan, the issuance of adequate EHS bridging documents for the drilling rig contractors. The correct implementation of these plans/documents was also guaranteed by TGL through the systematic implementation of an extensive auditing program.

Incident and near misses continues to be promptly recorded and analysed, through the use of a dedicated on-line application (EMEX), regardless of their severity level. The IESC verified the correspondence between the data stated in the AMR and the ones recorded in EMEX, without finding any discrepancy. TGL is also currently evaluating to switch from EMEX system to a new, more specific on-line application that will allow to manage the aspects of accident recording and investigation in a more efficient way. It is worth mentioning also that both index related to accidents (TRIF and LTIF) decreased compared to the previous reporting period (i.e. the total number of accident remained the same even if the total worked man hours increased significantly due to the restart of offshore drilling operations).

For what concerns the overall Process Safety Management of both Jubilee and TEN Projects, the IESC confirms that TGL diligently continued on following-up with its already-set Process Safety Management Improvement Plan (which was further strengthened during the reporting period) as well as with the activities related to the identification, management and performance assurance of Safety and Environmental Critical Elements (performed through the wide implementation of the MAXIMO system, which allowed TGL to substantially meet the target related to the Safety Critical Work Plan for the reporting period).

The Turret Remediation Project (TRP) on the KNK FPSO continued in 2018 with the successful turret stabilization and the new bearing installation. The FPSO was successfully rotated to 205° to further reduce fatigue damage. The installation of Bow Mooring Block for the permanent spread moor in position will be performed in September 2019. Another significant change foreseen for 2019 will be the installation of the CALM buoy at a distance of about 1,000 meters from the KNK FPSO, with the aim to reduce the risks related to possible collisions with the shuttle vessels used during oil offloading operations.

Therefore, in its capacity, the IESC could not record any evident non-conformance or specific matter of concern regarding the overall HS Management for the period under scrutiny and therefore encourages TGL to continue with its usual proactive and highly structured approach.

Regarding social aspects, TGL SP strategy in 2018 did not change compared to 2017, with focused on the usual key areas of intervention: socio-economic activities, which fall under the - Socio-economic Investment (SEI) Strategy, impact (fisheries) management and stakeholder engagement. The update of the Public Consultation and Disclosure Plan (PCDP) is scheduled for the second half of 2019. SP Project beneficiaries remained mainly the fishing communities of the seven coastal districts (formerly six before some recent administrative changes) 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. The expansion of the number of beneficiaries of the LDSP is scheduled for 2019.

Fishermen Sea Access continues to be a pillar of TGL SP strategy. TGL is focused on ensuring safety, deterring and preventing incursions into the Exclusion Zone (EZ) and Advisory Zone (AZ). The data provided for 2018 show an increase in the number of incursions into the AZ compared to 2017, as a consequence of the higher number of vessels involved for offshore activities. The positive news is that the number of incursions into the EZ reduced compared to 2017, confirming the decreasing trend started during the former years and thus the effectiveness of all prevention measures implemented.

In the past years, TGL started a process aimed at bringing the issue of Sea Access in the Government agenda to find new industry-wide solutions to the problem. The JV Partners commissioned in 2017 the development of a "Sea Access Framework" which was then handed over to the PC and to the Ministry for Fisheries. The PC has assumed a decisive responsibility and leadership role in driving the Sea Access Framework implementation: in 2018 it guided two National Multi-Stakeholder Safe Sea Access Framework Workshops to build increasing consensus on the recommendations proposed in the Sea Access Framework report of 2017. To implement the Safe Sea Access Framework two proposals were presented: the fish reefs project and the provision of transponders, both under review by the competent stakeholders.

Community engagement, stakeholder consultations and community participation continue to be of a good standard. During 2018 key activities were focused on aerial gravity survey and drilling campaign, data validation exercise for canoe owners (through the organization of workshops), FPSO Safety Zone Education against canoe incursion. During the reporting period, TGL and the Fisheries Commission completed the fishermen/fishmongers data collection and validation exercise started. 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) as already pointed out in the past IESC report. Part of the delay is caused by the long timeframe in TGL internal resolution process (which requires the involvement of a number of different TGL departments). 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.

In 2018, TGL has collected six grievances against the five reported in 2017, all referring to fishermen interactions. All grievances were re-curing grievances. Three out of the six grievances were amicably resolved (with the involvement of the Grievance Redress Committee), whereas the remaining ones are being resolved.

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.

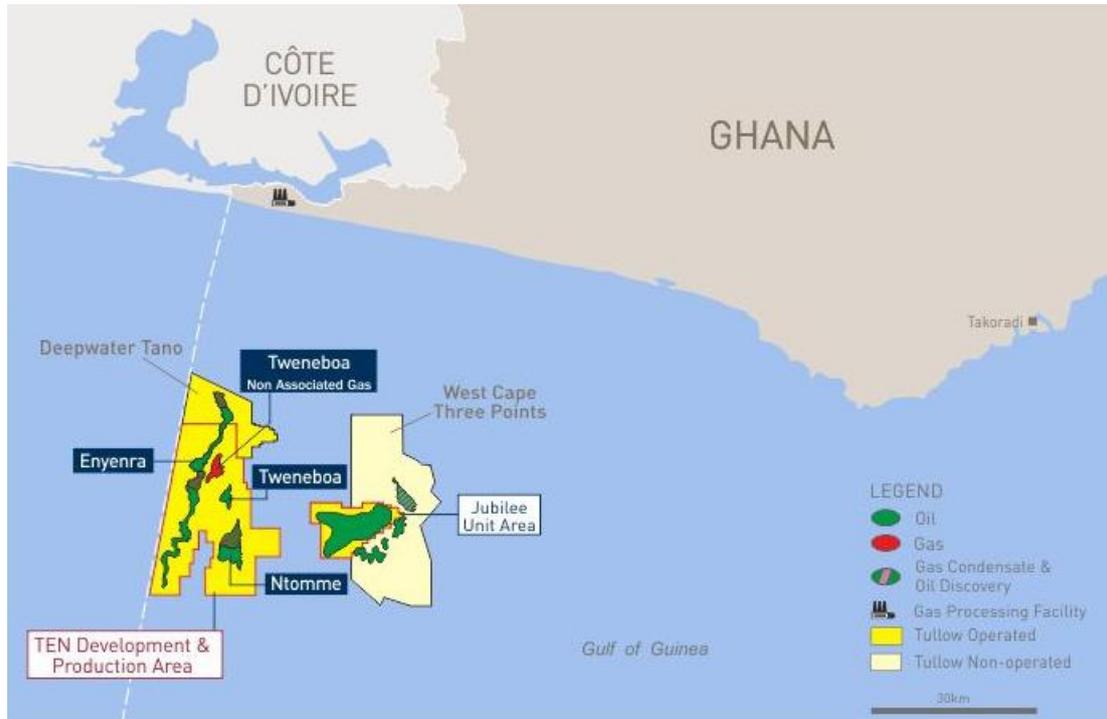


Figure 1.1: Location of the Jubilee and TEN Oil Fields

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.

Thanks to the ITLOS ruling in late 2017, drilling operations were resumed in the TEN field. Two rigs have been contracted, the Maersk Venturer Drilling Rig and the Stena Forth Rig.

The Maersk Venturer drilled three wells, completed four wells and performed a workover/ suspension on one well. In the Jubilee field, the Maersk Venturer drilled two wells and completed three wells and a workover in support of the current Jubilee production and Greater Jubilee Full Field Development.

The Jubilee FPSO met the oil production budget for the year and faced three major shutdowns driven by the Turret Remediation Project. The main turret bearing was stabilized and the FPSO was rotated from a heading of 177° to the permanent heading of 205° all without incident. The current mooring system will remain in place until the permanent mooring system installation is completed in 2019. The Oil Offloading System is in the design phase and is expected to be installed in 2020. Until that time, the shuttle tanker operation will continue.

On the TEN FPSO work continued on outstanding Work List to address operational anomalies or performance deficiencies identified during the Performance Test carried out.

With the significant changes in the Jubilee FPSO Operations with the introduction of the CALM Buoy, TGL will be undertaking a comprehensive update of the environmental impact statement for the Jubilee Development looking at the cumulative impacts of the original development and the infill development activities including the major modifications of the development physical infrastructure. Fabrication of the CALM Buoy is already ongoing and installation is scheduled for the first quarter of 2020.

1.2 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;
- ✓ 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 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 2018 AMR report (dated March 2019);
- ✓ 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 2018);
- ✓ 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;
- ✓ 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 7th May) with TGL, MODEC and Maersk Venturer staff. Interviews with Project staff;
- ✓ brief introductory meeting with Takoradi Leadership (8th May);
- ✓ visit to the Maersk Venturer Drilling Rig (8th and 9th 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 rig, meetings with TGL/ and Maersk Venturer personnel (TGL Company Man, TGL Well Delivery Manager, TGL HSE team, Maersk OIM and Maersk EHS Manager, 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 Maersk Venturer top management;
- ✓ meetings in the TGL Takoradi Office with the SP team (8th and 9th May) 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 participate to a sensitization campaign on seismic activities and consult the attendees; separate meeting with the fishermen leaders (including one member of the Ghana National Canoe Fishermen Council (GNCF) as well as of the Grievance Redress Committee); interview of one Community Liaison Officer (CLO) (8th May); visit to Domunli village where TLG financed a Livelihood Diversification and Support project (cassava production and processing);
- ✓ visit to the TGL Pipeyard and Warehouse facilities to observe the implementation of EHS aspects on site, and discussions with Project staff (9th May);
- ✓ ESHS wrap up meeting with Takoradi Leadership (9th May);
- ✓ final interviews in Accra (10th May) with TGL staff and additional documentation request/review; close out meeting with TGL Management, MODEC and Maersk Venturer managers to present initial monitoring team findings.

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

1. Annual Monitoring Report 2018;
2. Grievance Report for 2018;
3. example of a CLO weekly report;
4. Report of the 2nd National Multi-Stakeholder Safe Sea Assess Workshop of 4th April 2019;
5. Safe Sea Assess Framework Development Report (Centre For Environment & Health Research & Training, July 2017);
6. TLG updates organogram;
7. Terms of Reference for the set-up of the Ghana Oil and Gas Cumulative Impact Co-Management;
8. Maersk Venturer Permit to Work;
9. Environmental Management Plan Jubilee and TEN Development Rev.6 reviewed in June 2018;
10. Jubilee and TEN Field Environmental Monitoring FPSO Operations – Monthly Environmental Reports (2018);
11. Ambient Air Quality Monitoring Report 2018;
12. Noise Quality Monitoring Report 2018;
13. KNK and JEAM FPSO Stack Emission Report Nov 2018;
14. KNK and JEAM FPSO Internal Environmental Audit May 2018;
15. Zeal and Zoil Environmental, Health and Safety Audit March 2018;
16. TGL EHSAP Overview for year 2018 (including TRIF and LTIs summary);
17. TGL Jubilee Operations Safety Case (Rev. 04, October 2017);

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18. TGL TEN Operation Safety Case (Rev. 03, June 2018);
 19. TGL Well Engineering Assurance Plan for 2018;
 20. TGL EMEX Incident Investigation Reports (ref. 4156, 4178, 4260, 4339, 4340, 4362);
 21. TGL EHS Bridging Document Maersk Venturer (T-GH-WEL-BRD-0002);
 22. MODEC - Emergency Drill and Incident Facts Records;
 23. MODEC Operations: Permit to Work Main Procedure (0005-ACC60-15SM-0409);
 24. MAERSK Work Permit Requirements (M-CPH-1171-02677);
 25. MAERSK Work Permit System Guidance (M-CPH-1171-20697);
 26. MAERSK Venturer 2019 HSSE Action Plan;
 27. MAERSK Drill Matrix;
 28. MAERSK Drilling Full HSSE Course slides (e-learning).

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 2019 Status” column. Previous years tracking columns of ESAP items (IESC year on year status and feedback from 2011 to 2018) has been removed from the ESAP table for ease of readability. The “May 2019 Status” column outlines the IESC feedback and changes registered during the 2019 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 2019 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
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.	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 2019 Status IESC
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.
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.	(a) The Project has developed an ESMS development schedule and submitted it to IFC. (b) The Project has developed the ESMS for the production, drilling and installation phase, acceptable to IFC. (c) The Project has developed the ESMS for production operations, acceptable to IFC.	Completed.	ISO 14001 has been successfully renewed in 2018. Tullow Group underwent a re-certification assessment in 2018 and achieved ISO14001:2015 certification for Corporate Governance. TGL is currently in the process of obtaining the newly revised 2015 version. The process was delayed due to the request from Tullow Group to use a Ghanaian certification Company to obtain the ISO14001:2015. The EMP remains the main TGL plan providing guidance on the management of environmental impacts.



ENVIRONMENTAL AND SOCIAL ACTION PLAN Tullow Oil (#27918 and 31483) April 9, 2014				
Item	Action	Completion Indicator	TGL Update/Comments	May 2019 Status IESC
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.	(a) Inclusion of a draft EMP disclosure and reporting procedure in the Project's Public Consultation and Disclosure Plan. (b) Disclosure of EMP updates, including this Action Plan, and public disclosure of EMP completion reporting.	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.
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.	Training provided by TGL is fully described in the AMR and was reviewed during the site visit. Further details are provided in chapter 5 of this report.
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.

ENVIRONMENTAL AND SOCIAL ACTION PLAN Tullow Oil (#27918 and 31483) April 9, 2014				
Item	Action	Completion Indicator	TGL Update/Comments	May 2019 Status IESC
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.
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 2018 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 reports a decrease in GHG emission in 2018 compared to 2017 due to the completion of commissioning activities on the TEN FPSO. Additional details can be found in section 5.2.3.

ENVIRONMENTAL AND SOCIAL ACTION PLAN Tullow Oil (#27918 and 31483) April 9, 2014				
Item	Action	Completion Indicator	TGL Update/Comments	May 2019 Status IESC
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. In February 2018, TGL commenced the multi-year incremental drilling program to maximize production. Drilling cuttings and related waste quantities are reported in 2018 AMR.
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 June 2018. No ballast water discharge occurred for 2018 at the offshore facilities.



ENVIRONMENTAL AND SOCIAL ACTION PLAN Tullow Oil (#27918 and 31483) April 9, 2014				
Item	Action	Completion Indicator	TGL Update/Comments	May 2019 Status IESC
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 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.	(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 operations phase, acceptable to IFC.	Completed.	The WMP has been validated until 2020. Monitoring requirements remain in place and are regularly implemented by the Project. Monitoring results have been provided for 2018 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.
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 update reported or further action needed.



ENVIRONMENTAL AND SOCIAL ACTION PLAN Tullow Oil (#27918 and 31483) April 9, 2014				
Item	Action	Completion Indicator	TGL Update/Comments	May 2019 Status IESC
19	<p>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 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.</p> <p>The Project will develop spill scenarios for the operations phase Oil Spill Contingency Plan (OSCP).</p>	<p>(a) Availability of the Project's OSCP for the drilling and installation phase, including the spill trajectory model, acceptable to IFC.</p> <p>(b) OSCP for the production operations phase, acceptable to IFC.</p>	Completed.	<p>Current OSCP for the production and operations phase remains in place.</p> <p>The Jubilee OSCP is set to cover TEN Operations, with response resources and equipment to be shared with TEN. No update reported or further action needed</p>
20	<p>The Project will develop and adopt a H2S Program and ensure that it is also adopted by its contractors, as needed.</p>	<p>Availability of the Project's H2S Program, acceptable to IFC</p>	Not applicable.	Not applicable.

ENVIRONMENTAL AND SOCIAL ACTION PLAN Tullow Oil (#27918 and 31483) April 9, 2014				
Item	Action	Completion Indicator	TGL Update/Comments	May 2019 Status IESC
PS4: Community Health, Safety and Security				
21	<p>(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.</p> <p>(b) Procedure for boat traffic management and for warning boats away from the safety zone, including rules of engagement for use of physical intervention.</p> <p>(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.</p>	<p>(a) Education program information and schedule for meeting with villages.</p> <p>(b) Procedures provided to and accepted by IFC.</p> <p>(c) Security Plan provided to and accepted by IFC.</p>	Completed and ongoing.	<p>Education and awareness programs with fishermen and their representatives are still ongoing.</p> <p>TGL focuses its effort not only on enforcing the access prohibition to the AZ and EZ but also in preventing canoe incursions. Section 5.4.4 provides details on the management of Sea Access and on the implementation of the prevention strategy for canoe incursions.</p>
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	<p>(a) Availability of the program, acceptable to IFC.</p> <p>(b) Observations analyzed by an experienced marine mammal biologist and reported in the annual monitoring report to IFC.</p>	Completed and ongoing.	Program in place and consistently implemented. No update reported or further action needed.

ENVIRONMENTAL AND SOCIAL ACTION PLAN Tullow Oil (#27918 and 31483) April 9, 2014				
Item	Action	Completion Indicator	TGL Update/Comments	May 2019 Status IESC
	proposed Jubilee Field development. The program will be included in the final Jubilee ESIA and developed in consultation with the Ghana EPA.			
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 2018.
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				
2	TGL will develop a Safety Case for the TEN Project, including definition of environmental and societal hazards, and demonstrating ALARP levels for all relevant	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. TEN Operation Safety Case was revised and re-issued in March 2018.



ENVIRONMENTAL AND SOCIAL ACTION PLAN Tullow Oil (#27918 and 31483) April 9, 2014				
Item	Action	Completion Indicator	TGL Update/Comments	May 2019 Status IESC
	risks, including risks to coastal resources.			
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	The Jubilee OSCP is set to cover TEN Operations, with response resources and equipment to be shared with TEN.
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 (2018)	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 are updated to Cover TEN operations.	The Public Consultation and Disclosure Plan (PCDP) will be updated in 2019. No further action needed.

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 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.

The Integrated Management System (IMS) sets out all mandatory policies, standards and controls necessary to ensure that the Project activities and associated risks are effectively managed. In 2018, TGL continued to improve and simplify the Safety and Sustainability content within the IMS, incorporating feedback received as results of internal and external audits.

Regarding the management systems in place Offshore, the Jubilee FPSO (KNK FPSO) is owned by TGL, with MODEC serving as the O&M contractor. As such the EHS Management System reflects the structure of TGL. 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 the Maersk Venturer (visited by the IESC), TGL as field operator is responsible for assuring that the HSE arrangements are adequate and that Maersk and its subcontractors 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 forming part of the Jubilee and TEN projects have various 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

The AMR reports the following numbers of local workforce for 2018:

- ✓ 260 local permanent jobs (direct);
- ✓ 370 local permanent jobs created or preserved through local subcontractors;
- ✓ 140 local temporary jobs (e.g. during construction/maintenance).

The local content component is quite high, and the IESC note the percentage of women among managerial staff is currently around 63%.

In general, the IESC continue to observe a good level of management of TGL personnel. Only one grievance was raised in 2018 by an employee against a senior colleague.

In the third quarter of 2018, TGL launched the Operational and Business Excellence (O&BE) program, with the first phase focused on “People and Change”, aimed at identifying company performance improvements. This phase led to a restructuring in the business based on a consultative process, which led to about twenty-four employees being made redundant. These employees were provided with outplacement support prior to their exit (as in the past, the termination package is one month’s notice or pay in lieu of notice when an employee’s appointment is terminated as well as organization of workshops for skills development).

The Employee Engagement Forum, which was launched in 2015 is still in place, and occurs quarterly to discuss employee concerns and enable employees input into key business initiatives. Some of the issues raised in 2018 include:

- ✓ Employee Recognition – The Human Resources (HR) team was tasked to review and develop a proposal to reintroduce individual employee recognition;
- ✓ Long Service Award – The HR team was tasked to review the long service award procedure;
- ✓ Work Life balance – introduction of flexible working options (smart working already made available for employees);
- ✓ EEF Representatives training.

During the March 2019 meeting, the members of the Forum agreed to increase the frequency of the meetings to a bimonthly basis.

Regular coordination activities continue to take place between TGL and MODEC HR. TGL outlined that MODEC launched two internal programs, the new “Carrier Path” for MODEC employees and the “MODEC Reset”. The latter aimed at increasing efficiency between MODEC and TGL with regard to various responsibilities.

TGL management, the Business Unit Leadership Team (BULT), did not change from the past year with the exception of the new SP & Public Affairs Manager. The former manager (appointed in 2015) left the company and was replaced by an internal permanent staff member of the SP team. IESC welcomes the appointment of a former SP Advisor, as this ensures continuity with social activities and with the SP staff. Nonetheless, his previous position as SP Advisor remains vacant, reducing the SP team to only three SP Advisors (there were six in 2017), with each one coordinating a CLO. During the site visit, IESC noted that the SP team is overloaded which may impact the quality of their work and the capacity to adequately cover all activities. Even though the use of external consultants for the design and implementation of projects and activities in the SP field is increasing, the workload remains high. This is particularly relevant in view of the expansion of activities as a consequence of the additional SP budget allocated for 2019 (see section 5.4.1). TGL should consider adding at least one new member to the SP team. IESC also observed that the management of SP documentation and data is particularly time-consuming. 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 not being fully utilised, potentially as a consequence of insufficient availability of staff to populate this tool. TGL should consider Borealis a key tool for increasing the efficiency in the data management process and therefore dedicate an internal resource to the population/completion of the Borealis system to enable the full use of its potential. Once the tool is fully functional, it will likely result in significant time saving which is currently spent in data management, in particular for reporting purposes.

The O&BE program also resulted in the reduction of the number of CLOs (now three in total), covering the seven coastal communities. Their involvement in the SP activities has increased, in particular with regard to monitoring and reporting of projects (see section 5.4.1). In the past, CLOs often reported general discontent related to their salary, increased workload, inadequate tools and limited transportation allowances. In 2017 CLOs received a salary adjustment, new mobile phones and notebooks. To reflect the new workload, TGL recently provided a new salary adjustment. Nonetheless, some CLOs still report discontent for the lack of a dedicated office in the communities where they work (they are currently doing home-based work), and more in general for the fact they are hired through a contracting company. As already pointed out in the past, TGL should ensure continued monitoring of CLOs working conditions to avoid an escalation of issues, as acknowledgment of the important role they cover. The resignation of the CLOs would represent a significant loss for TGL, who should invest resources to train new people and establish new relationships in the affected communities.

5.2 TRAINING

TGL considers the implementation of a sound and continuous training program to the Projects’ staff as a priority. In continuity with what was done in the previous reporting periods, a wide range of training courses were provided in 2018. Training topics included O&G Crisis Management and Emergency Response, Incident Management, Process Risk Assessment, Process Safety Management, First Aid Training, IMO Level III Oil Spill Management, Business continuity in case of serious incidents or disasters, malaria online awareness, and marine mammal observation.

TGL ensure competency of MODEC and other contractors (including drilling rigs) employees through periodical updates on the implementation of their training programs, auditing and reviewing them on a regular basis and through the collection of specific KPIs. The IESC is also pleased to note that during the period under scrutiny a

number of joint training sessions specific for the rig activities were organized by TGL in collaboration with its rig contractors (see section 5.3.4 for further details).

5.3 CERTIFICATION

TGL operates under a range of permits for drilling, workover and production for the offshore activities at the Jubilee and TEN oil fields. The 3-year Jubilee Field Production Operations Environmental Certificate (which expired in May 2018), has been renewed and remains valid until 25 May 2019. TGL EMP was updated in June 2018 and submitted to the Gh EPA to secure the renewal of the Jubilee Environmental Certificate. The Certificate covers the ongoing KNK FPSO production, and operations logistical support including the chemical support facility. TEN 3-year Environmental Certificate (CE0018280622) covering the ongoing FPSO TEN production, operations logistical support and the chemical support facility, was obtained in 2017 and remains valid until 31st 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.

TGL obtained its first standalone ISO 14001:2004 Certification for the EMS in October 2012, applicable to the activities including and associated with exploration and production of oil and gas from the Jubilee Field and their management through partnership agreements and contract. TGL continues to use ISO14001 to verify the effectiveness of its environmental management systems.

Tullow Group underwent a re-certification assessment in 2018 and achieved ISO14001:2015 certification for Corporate Governance. Tullow Group requested TGL to use a Ghanaian certification Company to obtain the certification, which is expected to be achieved within 2019.

5.3.1 Periodical Review of ESAP Related Plans

ESAP action #6 requires regular TGL review and amendment of the EMPs. The EMP, which is the main document providing guidance on environmental management for Jubilee and TEN, was updated in June 2018 and will remain valid in its current revision for the next two years.

TGL also updated in May 2018 the Environmental Monitoring Plan (E.Mon.P.) (TGL-EHS-PLN-04-0006) and validated the Waste Management Plan (WMP) (TGL-EHS-PLN-04-0008) until December 2020.

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

5.3.2 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 an MOC system. The MOC procedure (TGJ-OPS-PRC-12-0001) was updated in March 2019 for Subsea Engineering because the Topside aspects procedures were moved into MODEC ownership.

As stated in our previous monitoring reports, the 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.

5.3.3 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.

The IESC, as per scope of work, verified the consistency of the data reported in the AMR with respect to the monitoring requirements. The IESC focused also on the report formatting and organization and discussed with TGL, during the site visits, potential modification or possible areas for improvements.

A specific suggestion for improvement concerning spill reporting is provided in section 5.2.2.5.

5.4 BIOPHYSICAL COMPONENTS

The following paragraphs present the outcomes of the conducted review of the biophysical environmental monitoring data and Project practices 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.

5.4.1 Waste Management

Waste produced at the Project facilities include the following main streams:

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

All the above components are managed according to the provisions of the WMP (TGL-EHS-PLN-04-0008), valid until December 2020.

5.4.2 Disposal of Solid Waste from Offshore Facilities

In accordance with MARPOL requirements, environmental monitoring records and information provided by TGL, covering both FPSOs and the Maersk Venturer, outline 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 visited Maersk Venturer Drilling Rig during the 2019 monitoring visit.

Onboard the FPSO's and the Maersk Venturer, 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 the past site visits conducted on board the KNK FPSO, the food macerator represented an issue due a malfunction failure caused by inadequate design of the machine and the pipes. 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). The macerator unit was replaced in 2017 with a larger unit, however, the discharge pipes were not substituted and, as such, blocked again upon usage. During the 2018 monitoring visit the macerator was still not in operation. According to TGL this issue was to be resolved during the galley and mess upgrade scheduled for July 2018. In December 2018, the IESC received from TGL the Remedial Action Taken Form reporting the installation of the new food macerator. The new macerator was provided with 4KW motor and a capacity of 1450 covers per sitting as well as a 700kg of waste per hour. Additionally, all piping has been upgraded to enhance the free flow of macerated materials overboard with macerator functioning as per specification. During the 2019 site visit the IESC was informed that the new macerator unit recently failed and it will be replaced by a new external unit with a different design aimed at overtaking the continuous failure problems. Reportedly, the new unit was already shipped to Ghana and was supposed to be installed after the IESC site visit.

The IESC appreciates the Project attempts to solve this repeated issue. The IESC and TGL agreed to share evidences of the new macerator unit installation as soon as available.

5.4.2.1 Drill Cuttings and Fluids

TGL resumed drilling activities in Jubilee and TEN fields in 2018. Two rigs came on contract, the Maersk Venturer Drilling Rig on 8th March 2018 and Stena Forth Rig on 3rd October 2018

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 both Ghana EPA and EMP requirements in place, low contaminated cuttings and fluids are discharged, via a caisson from the drilling rig, directly to the seabed (depth ranging between 1,100 and 1,700 meters), while high contaminated materials are collected and disposed of through the Waste Management Contractor Zeal in Takoradi. In accordance with the EMP (Waste Management 5) no discharge to sea is allowed except where:

- ✓ OOC concentration does not exceed 2% by weight on dry cuttings; and
- ✓ discharge is via a caisson at least 15m below surface level.

According to Gh EPA requirements, in case of failure to meet the above level of OOC, surcharges are imposed on an increasing scale depending on the % OOC reported, up until a maximum of OOC>15% where discharge to the sea is prohibited.

The oil on cuttings summary data for Jubilee and TEN fields in 2018 are outlined in the table below.

Table 5.1: Jubilee and TEN OOC Cuttings Summary for 2018

Description	Jubilee Field		TEN Field			2018 Average OOC% Annual Average
	J51-P	J53-P	En09-WI	En10-P	Nt05-P	
Well	J51-P	J53-P	En09-WI	En10-P	Nt05-P	2.17
Rig	Maersk Venturer	Maersk Venturer	Stena Forth	Stena Forth	Maersk Venturer	
Average OOC (%)	2.21	2.27	2.09	2.08	2.21	
Cuttings discharged (t)	713.35	713.35	719.37	625.85	607.24	

TGL currently pays a surcharge of USD 20,000.00 per well if OOC value for a well falls within the 2-5% range. All five wells drilled in 2018 fell within this range, therefore a surcharge of 100,000.00 USD will be paid by TGL per the EPA permit conditions.

During the 2019 site visit, the Maersk Venturer, was in well-completion mode and no cuttings treatment was ongoing. However, as observed by the IESC, the drilling rig is equipped with a comprehensive cuttings treatment and disposal facility with centrifuges, shakers and auger, all fitted out. As reported in the AMR, cuttings, prior to discharge, are treated in accordance with a multi-stage system managed by Schlumberger.

5.4.2.2 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.

The annual average of samples results for 2018 show that mercury and cadmium content of the barite is well below the above applicable limits with a sample average of 0.04 mg/kg for mercury and 1.60 mg/kg for cadmium.

5.4.2.3 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 2018 AMR no sand was produced or discharged from the FPSOs.

5.4.2.4 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. NORM procedures are in place for Jubilee and TEN FPSOs as well as Maersk Venturer.

As reported by TGL no NORM material was reported in 2018 at the offshore installation facilities.

5.4.2.5 Other Wastes

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 segregation procedures both onshore and offshore continues to differentiate waste into five waste categories (i.e. metal, wood, plastic, general and hazardous). During the site visit, the Maersk Venturer and the Takoradi shore base 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 Waste Manifest Form to improve the waste tracking system (observed by the IESC during the visit) is in place; it incorporates six duplicate (carbon) pages in different colors (as presented in Appendix 1 of the WMP) and must be completed for and accompany any transfer of waste from TGL facilities.

The 2018 AMR describes clearly the quantities and the final disposal of both hazardous and non-hazardous wastes generated by TGL. Due to the 2018 drilling activities, a significant amount of oily wastewater and tank cleaning waste were originated. Oily waste was collected at the Takoradi harbour and brought to Zeal Facility for the separation treatment processes. Recovered oil from the treatment was sent to ENH Emulsion Ghana, which uses the recovered oil for the production of bituminous road sealant.

5.4.2.6 Waste Management Contractors in Takoradi

Both waste management facilities have not been visited by the IESC since May 2017 due to the tight agenda of audit. However, during the past site visit the IESC always observed a high level of housekeeping and adequate pollution prevention measures at both waste facilities.

Zoil receives Non-hazardous general waste 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;
- ✓ several other waste segregation and processing activities.

Zeal is continuing to invest 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 had undertaken in March 2018 the annual EHS audit of Zeal and Zoil facilities, as required by its environmental management system certification to the ISO 14001 standard. The audit was carried out to satisfy these requirements within the standard and to follow up on Audit recommendations from the previous years.

No non-conformities were recorded at both waste contractors facilities.

5.4.3 **Waste Water Management**

Several wastewater streams, generated at the offshore and onshore facilities are monitored by the Project in accordance with EMP requirements, including:

- ✓ produced water (from crude oil treatment at FPSOs);

- ✓ process water (Maersk Venturer, Stena Forth);
- ✓ sewage water;
- ✓ deck drainage, bilge water and ballast water;
- ✓ desalination Plant Brine Discharge;
- ✓ desulphation water (associated with the Desalination Plant);
- ✓ well completion and work over fluids;
- ✓ spills;
- ✓ shore base liquid discharges.

5.4.3.1 Produced Water

Produced water is derived from gravity separation of crude oil collected and treated on the FPSOs and on the drilling rigs. It is discharged to sea following treatment process. Prior to discharge, measurement of oil in water content is conducted to ensure the discharge reference limits are met (IFC guideline: limits of <42 mg/L daily maximum and <29 mg/L daily average over a one-month period). 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 water (with oil concentration > 20 mg/L) 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 board the offshore facilities. TGL takes quarterly control samples and sends them to certified laboratories to attest to the validity of the on-board analyses.

Oil in Water (OIW) content performance against monthly average EPA and IFC discharge limits from produced water was met both at Jubilee and TEN fields throughout 2018.

5.4.3.2 Sewage Water

Sewage water on the offshore facilities 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.

5.4.3.3 Deck Drainage, Bilge Water and Ballast Water

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

5.4.3.4 Well Completion and Work over Fluids

These wastewater streams consist of oily water with Calcium Chloride used for well testing and clean up. According to EMP requirements, OIW 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 offshore facilities prior to discharge. In the event of exceedances, it is collected and disposed of at the onshore 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.

5.4.3.5 Spills

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.

The 2018 AMR lists 4 minor (< 1 bbl) liquid spills and 11 uncontrolled accidental releases of gas. The AMR describes two significant environmental incidents classified as "Actual severity of Level1" occurred within the Jubilee Field. The first one reported is related to an oil sheen observed on the 2nd May 2018 in the vicinity of Jubilee Field: the source of the release was unknown and therefore TGL started a verification on the equipment and machinery

located in the proximity of the sheen. Similarly, at 9.00 am on the 28th August 2018, oil sheen patches were observed by the EHSS Supporting vessel at 2.3 NM from the KNK FPSO. The oil spill response measures were activated and by late afternoon the sheen was dispersed following pro wash and mechanical dispersion. Water samples taken indicated that oil sheen was most likely related to engine/diesel oil rather than crude oil.

TGL reports in the annual Summary of OHS KPI only the spills that recorded an actual severity level greater than 3. As reported during the 2019 site visit, TGL experienced more loss of primary containment events rather than proper spills. In this regard, TGL reported an ongoing program for 2019 aimed at verifying the offshore facilities integrity. A Process Safety Scale Severity was developed also in accordance with the Loss of Primary Containment Plan. Reportedly, TGL is working to merge the Environmental Incident Severity and the Process Safety Scale Severity in order to have only one representative value for incident involving accidental spills.

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.

As also reported following the 2018 Site Visit, the IESC suggests to modify the future AMRs to clearly show in one 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) and the outcomes of the investigation process (root causes analysis, mitigation/prevention measures adopted).

5.4.3.6 Shore Base Liquid Discharge

During the 2019 site visit, the IESC had the opportunity to visit the Takoradi pipeyard. Due to time constraints, a visit of the chemical storage area at Takoradi seaport and Sekondi Naval base was not possible.

Reportedly, the chemical storage area is currently managed by Baker Hughes and no significant modification occurred for 2018. 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). 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.

5.4.4 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;
- ✓ ambient air quality monitoring at FPSOs and shore bases.

5.4.4.1 Emission Testing

The AMR reported in detail the Green House Gases (GHG) emissions data of the Project for 2018. 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 2018 are illustrated in **Error! Reference source not found.** The GHG emissions are quantified taking into consideration the Well Engineering Operations (Stena Forth and Maersk Venturer operations), Production and Operations (FPSOs production operations) and Aviation and Marine Transportation activities (including fixed wing and helicopter aviation and marine supply vessels).

TGL activities resulted in a total of 1,160,511 tonnes of CO₂ equivalent (tCO₂ eq) in 2018.

Table 5.3: Total GHG Emission by Source TGL Activities in 2018

	Well Engineering Operations Jubilee and TEN Fields Total tCO ₂ eq		Production Operations - Jubilee and TEN FPSOs' Total tCO ₂ eq		Aviation and Marine Transport Total tCO ₂ eq		TGL Total tCO ₂ eq
	Stena Forth	Maersk Venturer	FPSO MV 21	FPSO MV 25	Marine Transport	Aviation Transport	
GHG Emission 2018	13,667	38,189	598,009	405,092	100,998	4,556	1,160,511.

Compared to the total GHG emission in 2017 (approximately 1,494,870 tCO₂ eq), the total amount of emissions in the period under review has decreased. The reduction in GHG emission is mostly due to the reduce flaring on the TEN FPSO as commissioning operation were completed in the beginning of 2018.

The annual stack emission monitoring campaign was conducted on both FPSOs during November 2018. The stack emission testing was done to quantify emissions from the following sources:

- ✓ Gas Turbine Generators (GTG) A, B and C;
- ✓ Auxiliary Boiler;
- ✓ Emergency Generator and Fire Water Pump Forward;
- ✓ Port Side Crane and Starboard Crane.

The IESC appreciates that Stack Emission results have been reported and described in the TGL 2018 AMR as suggested in the IESC 2018 Monitoring Report (Doc. No. P0008071-1-H1 Rev.0 – June 2018). The sampling included the measurement of CO, NO_x (as NO₂), SO₂, TOC as CH₄ and Particulates.

Regarding KNK FPSO, the results indicate concentrations of NO_x measured at the GTG A, GTG B and GTG C, respectively of 211.88 mg/Nm³, 246.25 mg/Nm³, and 196.05 mg/Nm³, which exceed IFC Guideline Level applicable to gas fired turbines (51 mg/Nm³). Although GTG A, B and C show concentrations of NO_x slightly lower than the last campaign performed in May 2017, NO_x have been regularly detected at the GTGs over the last few years of monitoring.

TEN FPSO returned concentration of NO_x measured at the GTG A, GTG B and GTG C, respectively of 286.58 mg/Nm³, 251.75 mg/Nm³ and 287.13 mg/Nm³. Similarly, for Jubilee FPSO, also TEN FPSO shows exceedances of NO_x IFC Guideline Level applicable to gas fired turbines (51 mg/Nm³).

Exceedances of IFC guidelines for NO_x parameter were recorded also during past stack emission campaigns and the IESC verified manufacturer design specification to determine normal operating emission levels of the generators, with no irregularities found. However, it has to be highlighted that the results of the last offshore ambient air quality surveys undertaken on-board the FPSOs and the Maersk Venturer, did not show any exceedances of NO_x against World Health Organization (WHO) and Gh EPA limits.

5.4.4.2 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 and PC for review and approval. The Jubilee and TEN Operational Environmental Certificate was renewed without any issues raised by EPA and allows flaring production up to 3%. However, flaring performance for the both FPSO in 2018 has regularly exceeded Gh EPA limits for several months.

As indicated in the below figures, Jubilee Flaring Performance exceeded Gh EPA nearly every month and peaks are recorded in February with 100% of total gas production, March, April and June with about 20% of total gas production, July, August, November and October with percentage of approximately 10%.

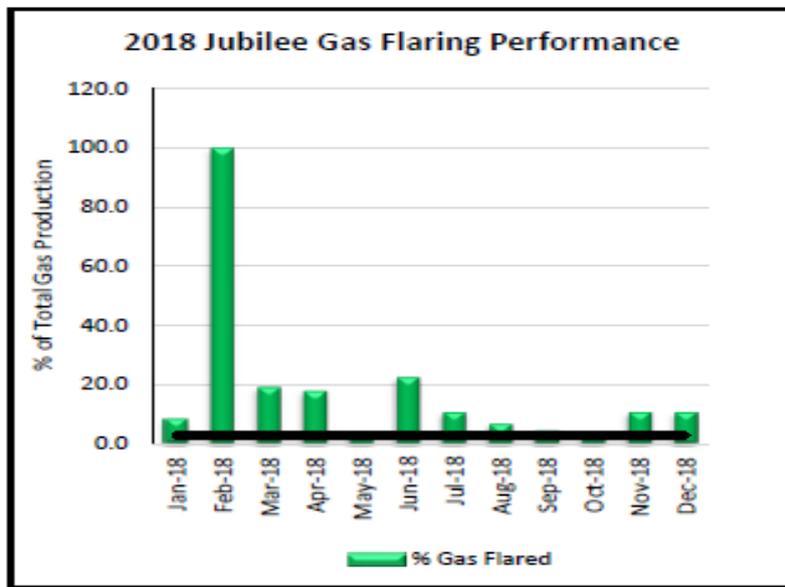


Figure 5.1: Jubilee Flaring Performance 2018

As reported by TGL, high flaring rates associated with the KNK FPSO in 2018 are related to several process upsets and maintenance activities. Specifically, the highest amount of gas flared in February 2018 and June 2018 was caused by two facility shutdowns necessary as part of the Turret Remediation Project (TRP). Additionally, at the beginning of February, a failure in the gas compressor system impacted the amount of gas injected and exported to the Gas Processing Plant resulting in the gas stranded diversion to the flare. TGL regularly notified Gh EPA about the shut downs and the gas compression system failure. As per the last year, KNK FPSO is also conducting general maintenance activities as part of TGL maintenance program and general upgrades related to the ongoing TRP project (planned to be completed by September 2019).

On the TEN FPSO, flaring rate exceeds the 3% limit of produced gas with the highest peak of 11% recorded in August. JEAM flaring rates are however moderate and associated with general maintenance activities on board.

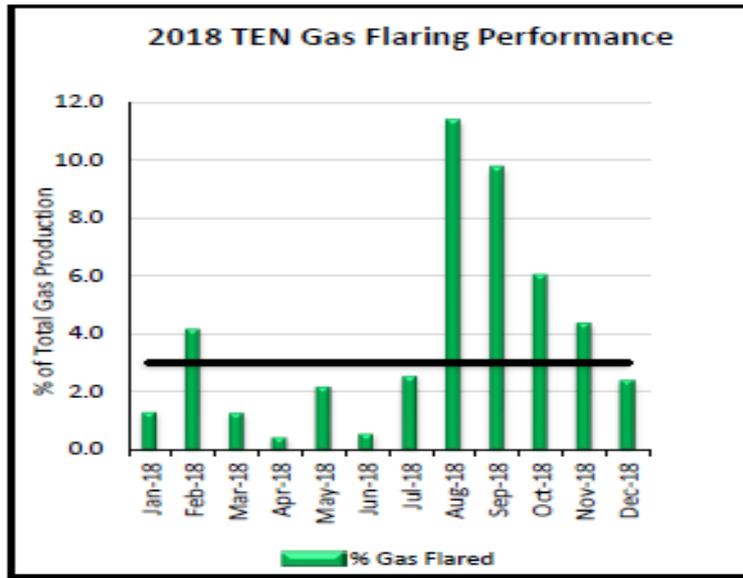


Figure 5.2: TEN Flaring Performance 2018

TGL released in June 2018 an updated version of the EMP. The updated plan includes a new section, namely the “Environmental Action Plan” (EAP) dedicated to specific environmental action programmes that address existing environmental problems that need to be addressed to ensure operational environmental performance is achieving regulatory compliance and good practice standards.

The EAP includes a FPSO Flaring Minimization programme aimed at reducing non-routine gas flaring to less than 5% of total gas production. The actions foreseen consist of:

- ✓ development of a Flare Management Plan which has been made available during the 2018 IESC site visit;
- ✓ maintain a rigorous and preventative maintenance programme for all process units/ modules on board the FPSOs;
- ✓ development and implementation of the engineering reliability process, procedures, performance standards and Key Performance Indicators (KPI) to improve maintenance and integrity performance.

The indicative budget assigned for the Flaring Minimization Programme is approximately 3,000,000 USD.

The IESC appreciates TGL attention to the flaring issue and considers the budget dedicated to the Flaring Minimization Program significant, however it would be useful to report how the budget will be allocated to the actions aimed at reducing flaring rates. Since 2017, regular maintenance, breakdown and shutdown periods have resulted in high flaring rates, which represent a constant environmental and OHS issue. Additionally, during the 2019 site visit, TGL clarified the technical limits of the Jubilee KNK FPSO which make the flaring minimization challenging.

The IESC in particular suggest to report in the next AMR, 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 also appreciate receiving by TGL an attributable 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.

5.4.4.3 Ambient Air Quality Monitoring

Ambient Air Quality Monitoring is a requirement outlined in the EMP for both FPSOs and onshore facilities in order to measure the levels of NO_x, NO₂, SO₂ and VOCs. TGL conducted in 2018 only the Offshore Ambient Air Quality Monitoring Campaigns for Sulphur Dioxide (SO₂), Nitrogen Dioxide (NO₂) and Ozone (O₃). Reportedly, the onshore

air quality campaign was not carried out due to the positive results of the last monitoring campaign conducted in 2017. The next campaign is foreseen for 2019.

The offshore campaign was performed onboard the two FPSO's of Jubilee and TEN fields and on the Maersk Venturer from 25th September 2018 to 6th November 2018. Air quality measurements have been conducted through passive diffusion tubes, which after the exposure period were packaged and dispatched to Passam Laboratories for the analysis. The captors located on the FPSO's were placed in the Outdoor Processing Areas, the Outdoor Turret area, Indoor Gallery Area and Indoor Office Area, while the captors on the Maersk Venturer were placed on the Rig Floor Area, Moon Pool Area, Heli Lounge Area and Galley Area. The results showed all concentrations were well below the WHO and Gh EPA limits for all the offshore installations.

5.4.5 Chemical Management

During the visits conducted at the Maersk Venturer, chemicals were correctly stored, Material Safety Data Sheets (MSDS) presence observed and adequate secondary containment noted. No spills were evident on the main decks visited and secondary containment and spill response material were located in the immediate vicinity. TGL adequately supervises the management practices of the subcontracted companies involved in the drill rig activities. However, at the Halliburton areas dedicated to the equipment involved in the well testing phase, the IESC suggests to fully implement the good practice of laminating all the MSDSs, to protect them from the elements and also to collect them together in order to make them readily available. Reportedly, no modification on chemical management occurred on board the FPSOs. The new laboratory facility on the KNK FPSO, approved since 2016, has not been installed yet. The IESC suggests installing the new laboratory unit as soon as available and practicable in order to decrease potential exposure to OHS risks.

High level of housekeeping have been generally observed at the Shore Base pipe yard and chemical storage areas. Nevertheless, as observed in 2018 site visit, the pipe yard chemical storage area is still facing scarce space issues. Some chemicals are stored outside of the area equipped with concrete containment: 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 suggest keeping the chemicals within the boundaries of the hazardous material storage area.

Although drilling activities require larger quantities of chemicals, TGL reported that is elaborating actions to reduce the need of chemicals supply and therefore the required storage space. TGL reported that a tender notice for the management of an additional chemical storage area was prepared and it will be awarded soon resolving the space issue at the pipe yard. The new area planned at the commercial port is still not yet available and it is under the responsibility of Ghana Port and Harbours Authority, therefore TGL transfer expected date to the new area is still unknown.

Due to time constraints, the IESC was not able to visit the chemical storage area at Takoradi Port. Nalco Champion is still operating and managing the area and no issues have been reported. The development of the new TGL chemical storage area within the commercial port is still undefined and therefore the issue related to the amount of dust released by cargo ships unloading lime at the shared wharf continues to poses a potential OHS issue for the contractor. Reportedly, Nalco employees wear Personal Protective Equipment (PPE) and suspend their activities when lime unloading operations occur.

5.4.6 Noise

For the period under review, TGL conducted the onshore noise survey at the shore base in Takoradi during Q3 of 2018. The noise survey was conducted at the following locations:

- ✓ Shore base warehouse entrance; and
- ✓ Shore base pipeyard.

The relevant results are provided in the following table.

Table 5.4: Noise Survey Results

Measurement Locations	LAeq dB(A)	EPA Permissible Limit for Industrial Areas dB (A)	IFC/WB (Industrial; Commercial) dB (A)
Shore base Warehouse	75.2	70	70
Shore base Pipe Yard	63.7	70	70

Reportedly, the high level of LA eq measured at the shore base Warehouse was due to forklift operation and several helicopter take-off and landing (crew change day) at the time of the survey. Indeed, the uptick in offshore operations, including well drilling and completion, has resulted in a more frequent number of helicopter flights. However, no issues have been reported and workers at the warehouse are provided with hearing protections for high noise activity as precaution.

The IESC notes that this is a one-off survey, and recommends that repeated surveys are conducted to establish a more comprehensive assessment, especially when exceedances are detected. The offshore environmental noise survey will be performed in 2019.

5.4.7 Ecology

TGL annual Marine Mammal Observation (MMO) programme has been regularly conducted since its inception in 2010 with the Jubilee development. The Marine Mammal and Turtles Avoidance Guidelines procedure was updated in November 2018. Observations and recording of sightings are performed daily by the trained crew of TGL's EHSS vessels (Gh Navigator, Pacific Porpoise, Pacific Phoenix and the Far Sitella and Pacific Raider).

Data obtained from EHSS vessels in 2018 do not report any unusual behavioural trends of marine mammals and no unusual large congregation of birds regarding marine avifauna sighting around the offshore facilities. A total of 38 MMO sightings have been reported for 2018. TGL maintains the previously established shipping lane to the Jubilee and TEN fields from Takoradi based on current safety requirements and in agreement with the Ghana Maritime Authority (GMA). This reduces the overall potential disturbance and collision risks. No recorded incident of marine vessel collision with marine mammal have been reported for 2018.

The final MMO report is currently under preparation and is yet to be submitted to the Gh EPA.

5.5 HEALTH & SAFETY COMPONENTS

For what concerns Health and Safety (HS) management, the main scope of the current IESC review was to verify whether the HS Management Systems – enforced on both Jubilee and TEN projects – continue to be fulfilled in compliance with the requirements set by the IFC PSs and, in case, to record non-compliances and/or suggestions for improvements.

Considering that both KNK and JEAM FPSOs were visited during previous years' monitoring activities, as well as the fact that during the reporting period drilling operations were resumed in Jubilee and TEN fields, the offshore part of this site monitoring included a visit to the MAERSK Venturer drilling rig, which started its operations in March 2018. The main aspects of Jubilee and TEN Management Systems were also reviewed as part of the site visit, and will be discussed in the following paragraphs. During May 2019 mission, the IESC visited the following facilities:

- ✓ MAERSK Venturer Drilling Rig;
- ✓ TGL headquarter in Accra;
- ✓ TGL shore base in Takoradi.

The IESC review was carried out by checking the relevant HS requirements and related collected records 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.

5.5.1 HS Management

Overall, the IESC observed a strong TGL management commitment towards safety (summarized by the "safety before production before costs" approach), continuously confirmed during the site visit and through the discussions with TGL employees and all their main contractors.

The HS management systems (part of TGL IMS) adopted for both Jubilee and TEN Development Projects are still considered as adequate in order to control of all their identified HS risks. It is noted that these management systems

are actually considered by TGL as “living documents”, subjected to regular reviews and/or possible improvements in order to reflect as much as feasible the current status of Jubilee and TEN Projects as well as to deal with any possible new HS risk that could be identified during their development. By the analysis of the available documentation, the IESC recorded many evidences of these constant updating activities. Among these, it is worth mentioning:

- i. the issuance of the third revision of the TEN Operation Safety Case (which can now be considered as aligned with the one developed for Jubilee);
- ii. the issuance of a Wide Lifting Improvement Plan (developed in order to tackle some new identified risks related to lifting operations);
- iii. the issuance of dedicated EHS bridging documents for the drilling contractors, including an extensive review and comparison between MAERSK HSMS / MAERSK Venturer Safety Case against the requirements of TGL IMS in order to find out and consequently close possible gaps in MAERSK HS management during operations. The same document was developed also for the other drilling rig (Stena Forth, which started its operation in October 2018 with a more limited scope of work).

Regarding the HS management of the two FPSOs, the IESC understands that in the last reporting period the situation was substantially unchanged compared to the situation previously recorded. Therefore:

- ✓ the KNK FPSO, owned by TGL and with MODEC acting as O&M Contractor, implemented the EHS Management System reflecting the structure of TGL Operations Framework (i.e. the Jubilee Operation Safety Case); and
- ✓ the JEAM FPSO, owned by MODEC which implemented an HS 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 HS requirements (i.e. 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).

Substantially, both FPSOs crews (which include MODEC and sub-contractors personnel) continue to be managed directly by MODEC. The IESC was also informed that, following MODEC organizational and equipment enhancements (“MODEC Ghana Reset”), TGL has decided to further reduce the presence of its own personnel on board of the KNK FPSO, reducing them only to some key positions (e.g. the Offshore Installation Manager and other management staff).

5.5.1.1 [Safety Inductions](#)

All TGL employees, contractors and visitors arriving at Tullow facilities systematically undertake HS induction trainings in line with the tasks they will be assigned to. These trainings are usually performed by skilled and qualified personnel and bolstered by the use of comprehensive slides and/or video clips related to the worker’s duty and responsibility towards the HS precautions to be taken on site while performing its activity.

The IESC confirms this, having attended:

- ✓ an on-line training over the EHS risks and preventive/protective measures as well as code of conduct to be followed while staying of board of the Maersk Venturer (the completion of this training is mandatory to access to the drilling rig itself);
- ✓ a complete and satisfactory general overview of all health, safety and environmental risks before starting its activities at TGL headquarter in Accra;
- ✓ a specific safety induction to raise awareness on the hazards that might be encountered during the helicopter trip offshore (this was done before each helicopter trip, together with all other employees); and
- ✓ a further induction training performed by Maersk Venturer HSE Manager and Site Doctor, in order to be informed about the drilling rig characteristics and associated HS risk. This was done by the support of an induction video, which is quite comprehensive and clearly addressing occupational and major hazards, emergency situations, means of evacuation and all safety rules to which all personnel must comply to. The main drilling rig areas (with particular attention to escape routes and assigned -muster points in case of emergency) were visited and introduced to the IESC as integral part of the safety induction (this is done for each new employee or visitor that has to spend overnight on-board).

5.5.1.2 Permit to Work and Isolation System

A Permit to Work (PTW) and Isolation System is in place on-board of both FPSOs as well as the operating drilling rigs 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 PTW procedure implemented by MODEC on both FPSO did not undertake significant changes compared to the one analysed during the IESC last site visit, and so it is still considered as adequate. On the other hand, also the PTW/ Isolation procedure implemented by Maersk on the drilling rig is deemed to be well-structured and complete.

During the site visit interviews, the IESC was informed about the procedure followed, which is relying on an on-line application software (IFS) which guarantees the avoidance of simultaneous works to be performed and the real-time tracking of the status of all PTW issued. Basically, Maerks system foresees two levels of PTW, categorized in base of risk considerations and the requirement for coordination and clearance:

- ✓ level 1 PTW is required for activities representing a potential high risk and for work that requires coordination and clearance at the installation level. This includes such activities as hot work, entry into confined space, isolation of safety systems, etc. This kind of PTW last for 12 hours and needs to be renewed if activities have to continue;
- ✓ level 2 PTW is used for all other types of work that due to risk requires coordination and clearance within an area or a system. Level 2 PTW lasts up to one week.

The IESC highlights that – during the development of the abovementioned EHS bridging document before the start of Maersk drilling rig operation – TGL identified and closed some gaps between Maersk and TGL standards, such as the need of issuing a level 1 PTW also for work at heights involving the use of hydraulic work baskets (which was not required under MAERSK PTW original procedure). Since the same approach was implemented also with the other drilling rig contractor, this can be considered as a good evidence of the constant monitoring implemented by TGL over its contractor's activities and its commitment to a constant improvement of its own/ their contractors related management systems.

All reviewed PTW were found complete in all their sections including: a detailed description of the work to be carried out, the identification of the hazards related to the operation and of safeguards to be implemented in order to minimise related risks (Safety Job Analysis), Toolbox talks performed, assigned Area Technicians and other responsible figures' signatures. From the result of the site interviews, no concerns related to the personnel awareness and competency in relation to the correct application of the PTW procedure could be raised.

5.5.1.3 Maersk Venturer Drilling Rig Workplace Conditions and Housekeeping

An extensive walkthrough on the Maersk Venturer Drilling Rig allowed the IESC to verify the standards related to workplace conditions, housekeeping and hygiene enforced on-board.

The IESC observed that accommodation areas are generally well-organized, relatively spacious, properly lit, kept clean and well maintained. The IESC had the chance to stay overnight and found the rooms satisfactory in terms of space, services and availability of emergency escape packs.

Regarding workplace conditions, all visited external working areas were found tidy, clean and kept in good condition as well. All observed work equipment (such as tools, machineries, pipes, lifting belts and chains, loading/offloading hoses) were found in good conditions, well-kept and regularly checked and/or maintained. Red zones / exclusion areas as well as areas potentially exposed to suspended loads risks were found properly identified, signalled and, in case, fenced. 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 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. The IESC noted only a couple of cases – in an area assigned to a Maersk contractor (Halliburton) – where a small number of temporary HAZMAT containers (tote tanks, barrels) were not provided with MSDS (i.e. these were damaged by the elements and/or were not inside the foreseen case). For this reason, the IESC recommends extending the already established good practice of laminating each MSDS supplied with temporary HAZMAT container to all drilling rig areas. In any case, emergency eyewash basins and bottle station as well as emergency showers are also present and periodically checked.

Finally, the visited medical facility appeared 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.

5.5.1.4 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 visited as well.

For what concerns Accra TGL Headquarter, the IESC observes the same situation recorded during the previous site visit. High-level standards were still observed: all working environments were 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 external office yard (including the muster point location) was found tidy, clean and free of any obstacles.

The IESC has also the chance to have a quick visit of the Takoradi shore base and pipeyard. Also in this case, no particular concern raised regarding HS practice. Housekeeping, stocking of materials, traffic regulation and safe forklift activities were observed. Hazardous materials are stocked separately in a dedicated area with MSDS promptly available in specific and clearly marked racks. In addition to the recommendation already pointed in section 5.2.4 of this report, the IESC still suggests to assure that all secondary containments under barrels and tote tanks are free of stagnant rainwater (to avoid a potential increase of the malaria risk).

On the other hand, the IESC noted a relative reduction of the amount of lubricants stocked near to the pipeyard fence: the IESC understands that this is due to an improvement in the procurement and stock management procedure related to this HAZMAT. The IESC suggest keeping on performing these improvements in order to reduce the amount of the stocks of HAZMAT material to the absolute minimum.

5.5.1.5 Personnel Protective Equipment (PPE)

The IESC observed that appropriate PPE was correctly worn by all operators on-board the MAERSK Venturer drilling rig. The recorded quality of PPE was in line with offshore standards. In particular, 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;
- ✓ gloves.

Additional PPE are prescribed for specific tasks such as grinding, welding, confined spaces or works over water, etc. and portable gas detectors are required in case of use of authorized electronic devices.

It is worth mentioning that TGL has enforced a "green hat policy" which requires all visitors (or workers employed from/for less than 6 months) to wear a green safety helmet in order to be adequately supervised by the assigned area responsible during the execution of their activities. This procedure was applied also during the IESC site visit to the Maersk Venturer drilling rig. Similar situation was recorded also in Takoradi shore base, where the IESC once again noted a strong awareness and commitment of TGL and contracted workers towards the importance of using the prescribed PPE at workplace. Consequently, not a single non-compliance was recorded during the current site visit.

5.5.2 Process Safety Management

Process safety risk management involves taking into account a number of technical (plant), managerial (processes) and human factor (people) activities which could lead to a major incident if not managed effectively.

For what concerns Jubilee and TEN Projects Process Safety management, their main aspects (such as FPSO operation, subsea facilities and wells as well as their main related EHS hazards) are identified in the FPSOs Operation Safety Case. TGL keeps constantly updated these documents, in detail:

- ✓ the KNK/Jubilee safety case was revised and issued in October 2017, taking into account major changes related to the failed turret bearing as well as the activities related to its remediation project (TRP); and
- ✓ the JEAM/TEN Safety case was revised and issued during the current reporting period (Rev. 03 was issued in June 2018).

For what concerns the drilling rigs operation, TGL has proactively performed a gap analysis of their related Safety Cases (e.g. MAERSK Venturer Safety Case) and agreed with its contractors to develop EHS Case Improvement Plan to bring them in line with the requirements included in TGL contract (such as the IADC Case Guidelines for Mobile Offshore Drilling Units).

In addition, the IESC once again positively observes TGL commitment to adopt the Safety Case as a learning document for the engineering, operations and EHS teams' workforce, with a number of courses delivered during the reporting period. Besides the ones organized by MODEC for the two FPSOs, it is worth mentioning also that TGL encouraged its rig contractors to adopt the same approach with also with the Operative Safety cases related to drilling rigs operations (Maersk Venturer and Stena Forth) by requiring them to create and implement a roll-out plan (training) for their specific improved EHS cases.

Finally, for what concerns the overall Process Safety Management of both Jubilee and TEN Project, the IESC confirms TGL strong commitment in continuing following-up its Process Safety Management Improvement Plan (which was further strengthened during the reporting period following TGL's new Process Safety IMS implementation as well as the decisions resulting from the "MODEC Reset" program, including the handover completion of the RiskPoynt software on both FPSOs) as well as the activities related to identification, management and performance assurance of Projects' Safety Critical Elements/Environmental Critical Elements (SCEs/ECEs). Further details related to SCEs/ECEs management are provided in section 5.3.7.

5.5.3 Incident Investigation & Reporting

The IESC continues to observe that all incidents and near misses are promptly recorded and analysed, on the basis of Tullow Incident Reporting, Investigation and Analysis (IRIA) Procedure. The same procedure requires that all incidents have to be reported within the TGL web-based incident reporting system (EMEX) within 24 hours. TGL IRIA procedure prescribes also that all major incidents (actual level 4 and 5 incidents according to TGL classification) have to be communicated to IFC within 3 days by e-mail and annually as part of the AMR.

During the site visit, the IESC verified the correspondence between the data stated in the AMR and the ones registered on EMEX, without founding any discrepancy. The IESC was also informed that for what concerns incident registration, investigation and reporting TGL is evaluating to switch from EMEX to a new, more specific online application which will allow to manage these aspects in a more efficient way.

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

- ✓ incidents occurred in Controlled Activity or Site – which are registered in EMEX and contribute to Tullow's EHS statistics;
- ✓ incidents occurred in Monitored Activity or Site – these 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.

For what concerns incidents occurred in TGL controlled activities or site, 7 recordable injuries were reported (three of them resulting in LTI). The IESC confirms that all incidents were investigated regardless of their severity level. The related incident investigation reports were found 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;
- ✓ (possible) corrective actions with Responsible Person and Deadline for implementation.

TGL registers also those incidents that could have realistically resulted in a major or catastrophic outcome (which are classified as HIPO). A detailed investigation is required for these incidents as well in order to identify appropriate measures to prevent their recurrence. For the reporting period, a total of 5 HIPO incidents were recorded. All those HIPO happened offshore and involved mechanical lifting operations of dropping of objects. For this reason, during the reporting period TGL has proactively tackled this trend by developing and starting to implement a "Wide Lifting Improvement Plan" (as mentioned in section 5.3.1: its full implementation is foreseen during 2019) as well as

“Dropped Object Prevention Procedure”, which include additional measures to further reduce the potential residual risks arising from the execution of the abovementioned activities.

5.5.4 Competency Management & Training Activities

As a general outcome of the site visit, the IESC confirms that all interviewed personnel (both onshore and offshore, belonging to TGL or Contractors) was found skilled, experienced, well-trained and fully aware of its duty and responsibility within the Projects’ organizational structure. This confirms TGL approach towards personnel training and awareness, which continued to be rightfully considered as a priority. An extensive number of trainings, covering a wide range of EHS topics, was carried out during the period under scrutiny, for both onshore and offshore personnel.

Among them is worth mentioning:

- ✓ Process Risk Assessment and Process Safety Management courses, delivered for operational leaders and EHS professionals of TGL and MODEC;
- ✓ Process safety Management training, held for operation, engineering and EHS team (this course includes also the familiarization with the latest updates of KNK and JEAM Safety Cases);
- ✓ Basic / advanced First Aid training, carried out by West African Rescue Association (WARA) Training Academy undertaken by employees from the Accra office;
- ✓ Dropped object training, involving personnel from all business unit (operation, logistics, EHS, subsea, well engineering); and
- ✓ Manual Handling training, performed to the crew of both KNK and JEAM FPSOs.

The IESC notes also TGL remarkable efforts in liaising with its drilling rigs contractors with the aim to organize joined training session specific for the rig activities, such as:

- ✓ Rig Safety Awareness Training (part of the Rig Safety Case Improvement Plan, this course was held by the crew of the drilling rigs in order to give to them a general overview of the underlying principles behind the development of the rig safety case, the major accident hazards associated with rig operations and relevant controls in place);
- ✓ Well process safety Awareness; and
- ✓ Rig-based dropped object prevention awareness (focalized on the site-specific risk and taking in consideration data from empirical evidences from rig-based surveys).

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

TGL ensures competency of MODEC, Maerk and other contractor employees via specific audits that include contractors training programs. During the site visit, the IESC reviewed TGL Well Engineering audit / training matrix for 2018 and confirms that the same includes also additional trainings, performed by TGL, on specific topics considered as critical (such as the Safety Case and Incident Investigation).

5.5.5 Emergency Management

TGL continues to keep in due consideration the aspect of Emergency Management at all organization’s levels. Phone numbers, proper reference on what procedures to follow and who to contact in case of emergency are specified to all TGL personnel since their first induction training.

Furthermore, as reported in the AMR, trainings and drills regarding more specific emergency scenarios were organized throughout the year, such as the International Medical Evacuation Exercise, a Well control emergency exercise (performed on one of the drilling rigs) and, in particular, the Annual TGL major exercise (TANO). The latter was performed in December 2018 to test TGL offshore response capability and coordination with other relevant agencies involved in case of major emergency situations (such as WARA, the EPA, Petroleum Commission, Ghana Navy and Air force). In any case, it is TGL’s goal 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.

IMO Level III Oil Spill Response trainings were provided for a range of TGL employees and contractors as well. 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.

For what concerns the offshore installations, 95 fire drills were performed (45 on the KNK and JEAM FPSOs, 50 on the drilling rigs) during the last year, against a mandatory frequency of three per year. The IESC reviewed some of the emergency drill records, covering a variety of emergency scenarios and still consider them as well-structured and complete, including data as i) simulated emergency scenario (fire, spill, man overboard, etc.), ii) type of alarm activated (either general of abandon ship), iii) sequence of events, iv) muster time and evacuation response, v) main findings/ observations and vi) actions to be taken and responsible party for implementation.

During the offshore site visit to the Maersk Venturer, the IESC had the chance to verify that well-defined emergency procedures are implemented on the drilling rig as well. Fire drills are performed on a weekly basis, emergency escape routes, clearly identifiable muster points (primary and reserve, organized with numbered stands for easy personnel's counting), were found kept clear at all times. Lifejackets for at least 100% of the POB capacity are provided on board. Personal lifejacket, together with emergency evacuation kit are provided in each accommodation cabin as well as in additional designated locations. The presence of very complete and detailed emergency information boards (i.e. station bills) were recorded at all rig's decks. Firefighting systems (fire extinguishers, sprinklers, water hoses), fire & gas detection systems and emergency evacuation systems (such as escape routes, lifeboats and life rafts, etc.) on-board were all found in good status and well-maintained. During the site visit, the IESC checked a number of fire extinguishers on board and confirms that they are regularly inspected as well.

5.5.6 HS Performance Monitoring

Regarding the HS index analysis, a total of 7 recordable injuries were recorded during the period under scrutiny, against a total of about 6,800,000 worked man-hours. Among them, 3 were Lost Time Injuries (LTI, for a total of 9 lost work-days), 1 was a Restricted Work Day Case (RWDC) and three of them were Medical treatment cases. All recordable injuries (except one) happened offshore, while all LTIs took place on the FPSOs). No Tier 1 Process Safety Incidents were recorded. Given the above, 2018 TGL LTI Frequency (LTIF) rate stood at 0.44, which showed a noticeable decrease compared to the 0.78 of the previous reporting period. On the other hand, also the Total Recordable Injury frequency decreased (from 1.38 of 2017 to 1.03 in 2018) substantially meeting the overall OGP TRIF average (used as the TGL benchmark) but not the TGL set target (0.89).

The IESC notes TGL continued to assure a constant monitoring of its project installation through the implementation of regular audits as well as the constant monitoring of a series of leading and lagging indicators, such as: i) Incident investigation quality criteria, ii) Leadership Site Safety Visit Plan attainment, iii) EHS and Process Safety Assurance Plan attainment and iv) overdue HIPO and high priority audit actions. All targets were met except for the one related to Leadership Site Safety Visit Plan attainment: TGL explained that the cause has to be retrieved in the numerous activities which were simultaneously ongoing during the period under scrutiny (e.g. FPSO shutdowns, the Turret Remediation Project, re-start of drilling operations, etc...).

On the other hand, TGL HS auditing program continues to be effectively implemented in accordance with Company procedures at TGL and MODEC levels, as well as on Contractors. In particular, the IESC records that constant audit activities are undertaken by TGL EHS personnel onboard on the Maersk drilling rig and that the drilling contractors EHS performance is detected through the issuance of specific quarterly EHS plans. Targets are set and an award system is foreseen to encourage the drilling rig contractors to further proactive measures to avoid harm to people and/or damage to the environment.

Concerning compliance with national reporting requirements, TGL submits monthly HSSE reports to the 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 or requests for corrective actions were submitted by the PC during the period under scrutiny.

5.5.7 SCEs/ECEs Management

As already mentioned in previous IESC monitoring reports, the IMSs 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 programs 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 is not only a UK legal standard, but it is now used worldwide serving as a good practice example). The OSCR 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;
- ✓ independent verification requirements.

Besides the requirements related to the development, integration, update and roll-out of the Safety Case(s), described in the previous sections of this report, the OSCR also requires that the Duty Holder (i.e. TGL) ensures that a record of the SCEs/ECEs is maintained. A Computerized Maintenance Management System (CMMS, or MAXIMO) is the main tool used by TGL to assure that the identified SCEs/ECEs are properly controlled/managed and therefore to guarantee their integrity of its assets. MAXIMO system, which became fully operational for both TEN and Jubilee in 2016, allows the maintenance/inspection team to effectively track the tasks to be carried out, to keep proper records of these tasks as well as to schedule the future ones.

During the reporting period, TGL continued to implement an inspection/maintenance program by systematically using MAXIMO system. The IESC observed that the CMMS covers inspection and maintenance activities of all identified SCEs/ECEs and allowed TGL the substantial attainment of specific Process safety KPIs (such as Safety Critical Work Plan) during the period under scrutiny.

An audit by an Independent Verification Body (IVB) was also undertaken on both FPSOs CMMSs during the reporting period, with overall satisfactory results. In any case, Improvement Plan on this MAXIMO system (which includes also the constant input of all new SCEs/ECEs necessary routine inspections inside the system itself) continued during the reporting period, as a specific project (Project ID no.7) embedded in the overall Process Safety Management Improvement plan.

Other remarkable activities related to the SCEs/ECEs management and control performed during the reported period were: i) Subsea Inspection Maintenance and Repair (IMR) audit, with audit results implemented and presented to management; ii) the completion of Risk Based Assessment (RBA) workshop on Risk Based Inspection (RBI) backlog deferral project: its output will be loaded in MAXIMO to enable new inspections to be carried out as per Corrosion Management Plan (CMP), and iii) the SCEs Corrosion Backlog Liquidation Plan Attainment.

To conclude, in its capacity the IESC could not find any specific matter of concern regarding this specific aspect for the reporting period and encourages TGL to keep on executing this proactive and highly structured approach.

5.6 SOCIAL COMPONENTS

5.6.1 TGL Social Performance Strategy

TGL Social Performance (SP) strategy did not undergo any changes in the reference monitoring period. SP programmes 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 seven coastal districts of Jomoro, Ellembelle, Nzema East, Ahanta West, Sekondi Takoradi, Effia – Kwesimintin (formerly under the Sekondi Takoradi Metropolis) and Shama.

The comparison between the AMR 2017 and the AMR 2018 showed an increase in the budget spent for SP activities (about 500,000 \$). IESC was informed that a further increase has been budgeted also for 2019. This additional budget is being addressed mainly to the implementation of the STEM program, for the Sea Access Framework development and for the Livelihood Diversification and Support Project (LDSP).

In line with the past, the SP programmes are focused on the following key areas of intervention:

- ✓ *Socio-economic Investment (SEI) Strategy* (funded through TLG 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* is 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 Tullow 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 at all levels of education. Specifically, the Strategy is implemented through the following initiatives: “Sustainable Kindergartens”, “Innovate to Educate Programme”, “Right to Dream Foundation”, “African Science Academy”, “STEM Scholarships” and “Support to Quality Education”.

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

- ✓ 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. Fishermen and their households have been introduced to and trained in vegetable farming using greenhouse technology, piggery through the use of indigenous microorganism technology and improved cassava farming and processing. Currently, the project is benefiting 250 households from select communities within five coastal districts (i.e. Shama, Ahanta West, Nzema East Municipal, Ellembelle and Jomoro Districts). The supported activities are progressing well and they resulted in an average increase in household income of approximately 700.00 GH\$ per month. Based on this positive performance, the JV partners intend to expand the number of beneficiaries in those communities which in the past did not express any interest towards the LDSP;
- ✓ the TEN-Wins and Community Environmental Management Project: the TEN Wins programme aimed at strengthening health and hygiene education in basic school and spreading in the coastal communities environmental management practices, climate change and environmental sanitation concepts. 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 is now reaching out to 75,000 community members in 50 communities and about 23,000 schoolchildren in 75 schools across the impacted coastal districts;
- ✓ Road Safety Campaign: the activity consists in a road safety campaign aimed at enhancing road safety consciousness within TGL impacted communities through training, workshops, demonstration and games. In 2018, Tullow and its partners together with the National Road Safety Commission and OSHA international, organized a road safety training. The 5-day training was a Trainer of Trainers session for key stakeholders related to the transport sector in the Western Region (i.e. Ghana Police, Fire Service and other security agencies, NGOs, media, CBOs, drivers’ union and service companies in the oil and gas sectors);
- ✓ 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. The JV Partners commissioned in 2017 the development of a “Sea Access Framework” which was then handed over to the Petroleum Commission and to the Ministry for Fisheries in order to make it an industry-wide concern. Details on the Sea Access Framework development and management of the AZ and EZ by TLG are provided in paragraph 5.6.4.

In October 2018, the Petroleum Department of EPA conducted a social compliance audit to evaluate how TGL is managing the social impacts from its operations both from the Jubilee and TEN projects and its associated support facilities. The audit was focused on the grievance mechanism and on the effectiveness of the mitigation interventions being implemented. Ghanaian EPA did not identify any non-compliances but made some observations and recommendations to be addressed by June 2019. Recommendations referred to:

- ✓ TLG to report and show evidence of community involvement in the selection of social mitigation interventions/projects to ensure ownership and full commitments of beneficiaries;
- ✓ TGL to ensure that the CLO’s are tasked to effectively monitor and report regularly on social mitigation interventions/projects within their jurisdiction;
- ✓ TGL to replace the dusty floors of the classrooms of the kindergarten project in Bakanta (goodwill initiative) to minimize the risk of children dust exposure.

TGL informed that actions are being implemented. The issue of project monitoring has already been pointed out in the past by IESC. A Monitoring and Evaluation Plan was prepared in 2014 (and never updated) but the plan is not actually anymore in use. The SP team informed that 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 with milestones achievement, benchmarked against established KPI. Being financed by Tullow group, the results of SEI projects are also shared and analysed at Tullow corporate level. Following EPA audit, TGL

decided to further increase SP commitment towards project monitoring by strengthening the role of CLOs. CLOs tasks' include, among others, the control over the projects implemented in their area of work. Their yearly plan of activities is defined together with the SP team based on TGL objectives (midterm adjustments are possible). CLOs have to report on a weekly basis activities conducted. Finally, they are now also involved in the weekly meetings of the SP team to ensure continuous information exchange on projects and impacted communities.

IESC was informed that the updated version of the Public Consultation and Disclosure Plan (PCDP) should be issued in about three months: a consulting will be contracted to do this activity, based on ToR provided by TLG. The focus should be on two main aspects: the analysis of the impact/ influence of the different modus operandi of the other operators in the region on TGL activities and decision-making process; the analysis of the impact/ influence that TGL might face from the growing experience of the regulator in the SP field.

The SP strategy is aligned with the IMS but not an integral part of it. The reason explained 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. Nonetheless, IESC was informed that the SP team together with the Planning Team will start in the second quarter of this year a process of revision of the main SP documents. The purpose is to ensure full alignment with the IMS. The future integration of the SP component into the IMS has not been excluded.

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

5.6.2 Community Engagement / Consultation and Disclosure

Community engagement continues to be implemented to 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 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.

During 2018 key activities in the areas of stakeholder consultations, engagements and community participation focused on:

- ✓ Aerial gravity survey and drilling campaign;
- ✓ Data validation exercise for canoe owners (through the organization of workshops);
- ✓ FPSO Safety Zone Education against canoe incursion.

The main step undertaken to allow the engagement of fishermen and fishmongers 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 the fishermen of all coastal communities (see section 5.6.3 for details on the data collected). The information collected are being recorded into the TGL database (Borealis) to allow the Company to better target its stakeholder engagement activities, facilitate the process of grievance resolution (see section 3), and guide the selection of the new future beneficiaries of the LDSP.

5.6.3 Grievance Management

In 2018 TGL has collected six grievances against the five reported in 2017 (representing an increasing trend since 2016), all relevant to interactions with fishermen. All grievances were re-curing, with no grievances recorded for the first time in 2018. Three out of the six grievances were amicably resolved, whereas the remaining ones are being resolved. The resolution involved the investigation of the Grievance Redress Committee.

As already pointed out in IESC past report, 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; and
- ✓ internal steps to be conducted within different TGL departments (i.e. AP Team, legal department, financial department).

The lack of reliable data for canoe owners identification has been basically almost overcome through the completion of the data collection and validation exercise which was started in 2017. The SP team collaborated with the Fisheries Commission on this exercise to identify the gaps on fishermen database which was developed in 2014. 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. The information is significant to the entire Safe Sea Access Framework particularly in the management of grievances and implementation of the proposed canoe tracking.

TGL should however 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 and avoid problems for the SP team which has to regularly deal with the communities. Specifically, 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. A suggestion could be to escalate the issue to the company management in case the internal deadlines are not met by the different departments involved.

5.6.4 Sea Access Framework and Exclusion Zone Management

The management of the EZ and AZ remains the main issue that TGL Project has to face in terms of 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 peak was recorded in 2016 as an effect of the arrival of the JEAM FPSO. In 2017, TGL reported a reduction of canoe incursions in the EZ but an increase in the AZ. The data provided for 2018 show an increase in the number of incursions into the AZ compared to 2017, as a consequence of the higher number of vessels involved, which attract the fish stock (and consequently fishermen). The positive news is that the number of incursions into the EZ reduced compared to 2017, confirming the decreasing trend started during the former years and thus the effectiveness of all prevention measures implemented.

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 (AP) team and the SP team and the big effort done in tracking on a daily basis and regularly analysing all incursions.

TGL AP team provides SP Induction for Navy Deployment: 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. Furthermore, Public security providers who support TGL operations should comply with International Human Rights Law, the UN Code of Conduct for Law Enforcement Officials and accompanying Basic Principles on the Use of Force and Firearms, whilst conducting their duties.

As explained above, TGL is committed in mitigating Project impacts on fishermen, ensuring safety and enforcing law in the security zone. The LDSP promoted by TGL represent an important effort towards the creation of alternative livelihood which could help reducing the number of canoe incursions. In the past years TGL also started a process aimed at bringing the issue of Sea Access in the Government agenda, which is committed through several initiatives to find new industry-wide solutions to the problem. The JV Partners commissioned in 2017 the development of a "Sea Access Framework" which was then handed over to the PC and to the Ministry for Fisheries in order to make it an industry-wide concern. The Sea Access Framework Development Report (Final Draft Report, prepared by the Centre for Environment & Health Research & Training) was issued in July 2017. The study, which was based on a broad stakeholder engagement process, had three main objectives, which were:

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

The PC has assumed a decisive responsibility and leadership role in driving the Sea Access Framework implementation. The 1st National Multi-Stakeholder Safe Sea Access Framework Workshop was held in Accra in January 2018 under the guidance of the PC, with funding from the Jubilee/TEN Partners. The objective of the workshop was to build increasing consensus on the recommended Sea Access Framework actions and had over 80 participants attending. The 2nd National Multi-Stakeholder Safe Sea Access Framework Workshop took place in April 2019 in Takoradi and it attracted over 140 participants, made of all stakeholder groups and relevant representatives. The objective of the workshop was to adopt the Safe Sea Access Framework recommendations

for Integrated Cumulative Impact Management. To implement recommendations of the Safe Sea Access Framework two proposals were presented: the fish reefs project and the provision of transponders. The fish reef project seeks to replenish the dwindling fish stock by introducing direct intervention for modernizing the artisanal fishing industry. The transponders seek to enhance the enforcement of regulatory requirement and the promotion of safe offshore mutual co-existence through the installation of simple tracking systems that will deter incursion into the restriction zones. These proposals are currently under review by the competent stakeholders.

Thanks to its extensive experience, TLG is also helping the PC in drafting the SP Guidelines for the oil&gas sector in Ghana.

Finally, in 2016, IFC started a review to identify and promote opportunities for co-management of cumulative impact in the coastal area of the Western Region of Ghana. IFC, in collaboration with the World Bank, engaged with the current upstream Oil and Gas operators (IFC / World Bank Group clients) and the Ghanaian regulators, namely PC, EPA and Fisheries Commission. A multi-stakeholder roundtable was convened by World Bank Group in June 2018 which involved the current upstream oil & gas operators (IFC/ World Bank Group clients), the PC, EPA and Fisheries Commission. The Roundtable agreed on action points to set up a “Steering Committee” to support collaborative co-management of environmental and social impacts associated with oil&gas operations in Ghana. It was agreed that the PC would be the lead agency in collaboration with EPA. Operators confirmed their interest in participating to the establishment of the Steering Committee and co-management of cumulative impacts. Given the positive response by both regulators and operators, the World Bank Group agreed to support the establishment and initial operation of the Steering Committee. The set-up of the Steering Committee is currently ongoing.

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