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THE DEEDS REGISTRY GUYANA

GUYANA

COUNTY OF DEMERARA

APPROVAL OF DEVELOPMENT PLAN (ADDENDUM)

Liza Phase 2 Development

UNDER

PETROLEUM PRODUCTION LICENCE dated 15th June 2017, Deed No. 971/2017

AND

MEMORANDUM OF CANCELLATION OF DEED dated 29th April, 2019, No. 751/2019

THIS DEED IS MADE this 20th day of May 2019, **BETWEEN His Excellency President David A. Granger**, President of the Cooperative Republic of Guyana and the **Minister Responsible for Petroleum representing the Government of the Co-operative Republic of Guyana** (hereinafter referred to as "the **Minister**") of the one part;

-And-

Esso Exploration and Production Guyana Limited, a company incorporated in the Bahamas and registered in Guyana under section 259 of the Companies Act Chapter 89:01, with a registered office at 62 Hadfield And Cross Streets, Werk-en-Rust, Georgetown, Guyana (hereinafter referred to as "Esso'), **CNOOC Petroleum Guyana Limited** (formerly **CNOOC Nexen Petroleum Guyana Limited**), a company incorporated in Barbados and registered in Guyana under section 259 of the Companies Act Chapter 89:01 with a registered office at 62 Hadfield And Cross Streets, Werk-en-Rust, Georgetown, Guyana (hereinafter referred to as "CNOOC"), and **Hess Guyana Exploration Limited**, a company incorporated in the Cayman

Islands and registered in Guyana under section 259 of the Companies Act Chapter 89:01 with a registered office at 62 Hadfield and Cross Streets, Werk-en-Rust, Georgetown, Guyana (hereinafter referred to as "Hess"), all together being Joint Venture Licensees and hereinafter collectively referred to as **"the Licensee"**) of the other part.

WHEREAS the Licensee is the holder of the Petroleum Production Licence dated 15th June 2017, Deed No. 971/2017 (the "**Licence**"), in respect of the block or blocks constituting the petroleum production area particularly described and identified in the said Licence and the Schedule thereto, such petroleum production area being within the Stabroek Block, Guyana (the "**Petroleum Production Area**");

AND WHEREAS the Licence is the sole and exclusive Petroleum Production Licence granted to the Licensee covering the Petroleum Production Area and Esso is the approved Operator under and subject to the terms and conditions of the Licence;

AND WHEREAS the Licence approved the Liza Phase 1 Development Plan dated December 2016, bearing document number GYLZ-ED-BPRDE-00-0001 (hereinafter referred to as the "**Development Plan**"), for the Petroleum Production Area, which Development Plan is annexed to and forms part of the Licence which was duly filed and recorded with the Deeds Registry, Deed No. 917/2017;

AND WHEREAS pursuant to the terms and conditions of the Licence, the Development Plan may be amended with the approval of the Minister;

AND WHEREAS on 13th June, 2018, Esso, representing the Licensee, submitted to the-then Minister responsible for Petroleum, the Honourable Raphael G.C Trotman, Minister of Natural

Resources, **an application requesting the Minister to approve an amendment to the Development Plan by way of the inclusion of a Development Plan Addendum: Liza Phase 2**, dated June 2018 document number GYLZ-ED-BPRDE-00-0002 (hereinafter referred to as the "**Addendum**");

AND WHEREAS the Minister, by a Deed made between the Minister, representing the Government of the Cooperative Republic of Guyana of the one part and Esso, CNOOC and Hess of the other part, dated 29th April 2019, Deed No. 751/2019 duly approved the aforementioned amendment to the Development Plan by way of the said Addendum (hereinafter referred to as the "**Prior Approval**");

AND WHEREAS the Parties now desire to cancel and terminate the aforesaid Prior Approval and the aforesaid Addendum **AND** to **Re-Issue** and **Re-state** the aforesaid Prior Approval and Addendum with full effect from the date hereof;

NOW WHEREFORE on the basis of Esso's application of the 13th June 2018, such application having been made pursuant to the terms and conditions of the Petroleum Production Licence dated 15th June 2017, Deed No. 971/2017 (the "**Licence**") **I, President David A. Granger, Minister responsible for Petroleum, hereby approve the amendment of the Development Plan by way of the inclusion of the Development Plan Addendum: Liza Phase 2** (the "**Approval**"), the Approval being **subject to the terms and conditions of the Licence,** and **the said Development Plan Addendum: Liza Phase 2** (the "**Addendum**"), being hereto annexed and **forming part of the Approval**, describes the construction, establishment and operation of certain facilities and services (herein called the "**Liza Phase 2 Development**")

proposes to undertake pursuant to the Licence in respect of the block or blocks constituting the Petroleum Production Area particularly described and identified in the said Licence and the Schedule thereto, such Petroleum Production Area being within the Stabroek Block, Guyana; and the Liza Phase 1 Development Plan dated December 2016, bearing document number GYLZ-ED-BPRDE-00-0001 and the Addendum dated June 2018, bearing document number GYLZ-ED-BPRDE-00-0002 shall be collectively deemed "the Development Plan" under the Licence, as follows:

1. I hereby cancel, terminate and make void the Prior Approval and the Addendum effected by Deed executed between the Minister responsible for Petroleum representing the Government of the Cooperative Republic of Guyana, of the one part, **And** Esso, Hess and CNOOC of the other part, dated the 29th day of April, 2019 and numbered 751/2019, with effect from the date hereof, and Esso, Hess and CNOOC hereby accept the aforesaid cancel, terminate and voiding with effect from the aforesaid date hereof.
2. **Recognising** the Government of the Cooperative Republic of Guyana's cognisance of its responsibility to prudently manage Guyana's petroleum resources for the benefit of all Guyanese, present and future, this **Approval** dated the 20th May 2019 (the "**Approval Date**"), **is hereby deemed effective as of the 13th August, 2018** (the "**Effective Date**") and **subject to the following terms and conditions:**

    a) Noting that the deployment time of 21 days provided in the Development Plan is not acceptable to the Government of the Cooperative Republic of Guyana, the Licensee will

establish a long-term solution being a Regional Capping Stack ("RCS"), or other solution as accepted by the Minister, the preferable locale of the RCS being Georgetown, Guyana, so as to deliver the deployment of a Capping Stack within five (5) calendar days of a well control event with loss of containment. The Licensee is therefore immediately required to implement a study detailing *inter alia* as applicable –

i) how the Licensee intends to provide for capping stack deployment available in Guyana within five (5) days from a non-regional source within the next twelve (12) months, from the date of issuance of the Approval, during its current drilling campaign;

ii) the Licensee's establishment of its long-term solution of a Regional Capping Stack, or other solution as accepted by the Minister, which shall be put in place within twelve (12) months from the date of the Approval of the study; and

iii) the logistics and costs associated with deployment and the capital and operating cost associated with establishing the regional solution.

and thereafter submit the said study to the Minister for his approval, such approval to be expressed in writing, so as to guide and ensure the Licensee's compliance with this term and condition to the satisfaction of the Minister, such satisfaction also to be expressed in writing. The Licensee shall initiate actions to ensure compliance immediately upon the Minister's approval of the study.

b) The Licensee shall follow the required practice in the US Gulf of Mexico in calculating "Worst Case Discharge" and to validate the assumptions and calculations by obtaining an independent assessment to develop an estimate of the flow that would result from an open hole well control event with loss of containment. This independent assessment shall be used as the basis for the Oil Spill Response Plan and oil spill modelling.

c) The Licensee shall perform an annual audit, external to Esso, on all critical drilling operations and environmentally sensitive critical production operations to assess their full compliance with the Licensees' Operations Integrity Management Systems. The Licensee shall provide the results of such regular audits to the Department of Energy within thirty (30) calendar days of completion.

d) The Licensee shall enter into a mutually acceptable Decommissioning Security Agreement for the Liza Phase 1 and Lisa Phase 2 Developments that follows the methodology and approach contained in the United Kingdom Industry Model Form Decommissioning Security Agreement (Non-PRT) dated October 2015 or consistent with other similar international best practice standards.

e) Within six (6) months from the date of the Approval, the Licensee will supplement the Environmental Impact Assessment (EIA) with the following improvements, *inter alia* as applicable:

i) Redefine the criteria for assessment of magnitude and sensitivity to tighten definitions and subjectivity, in doing so ensure the potential under estimation of magnitude, sensitivity and significance is removed;

ii) Provide descriptions of Best Available Technology (also known as Best Available Techniques) considering both technical and economic feasibility for key systems such as drill ships, including mud and cuttings treatment equipment, and the FPSO operations including, but not limited to, power generation, gas processing, injection compressors, produced water treatment and sulphate removal plant;

iii) Provide full descriptions of the Development Plan, alternatives and an explanation of the main reasons for the chosen development plan considering environmental factors;

iv) Provide full descriptions of the alternatives that have been considered for the treatment or disposal of produced water;

v) Analyse and quantify the impact, magnitude and severity for Greenhouse gas emissions, providing evidence of a Greenhouse gas reduction/minimisation plan, together with how Greenhouse gas emissions have been rated, discussed and addressed within overall project design;

vi) Detail a gas flaring minimisation plan;

vii) Provide evidence of the Licensee's commitment to select chemicals with the least hazard and lowest potential environmental and health risk whenever possible; and

viii) Revise and update the associated documents accordingly: The Environmental and Socioeconomic Management Plan including the Waste Management Plan, the Decommissioning Plan and the Oil Spill Response Plan.

f) The Licensee shall target an overall production system availability of the Liza Phase 2 Floating, Production, Storage and Offloading vessel (FPSO) of ninety-eight percent (98%) and shall work to maximize the availability for the overall production system inclusive of the Subsea System and Wells taking into account Good International Oil Field Practice (GIOFP). In doing so, the Licensee must adopt GIOFP in establishing the Liza Phase 2 FPSO topsides design and ensure, *inter alia*, that the installed capacity for all process and main utility equipment meets or exceeds one hundred percent (100%) and that there is spare capacity on separation, flash gas compressors, main compressors and gas treatment. The proposed overall production system must be independently assessed by a third-party consultant to confirm its suitability in keeping with GIOFP in general and the specified requirements of the Approval, making particular reference to confirm the improved availability target. This assessment must also include, but not be limited to, all elements of the production system – Well, Subsea and FPSO - along with the Tanker off-loading system, and consider the following:

i) Minimisation of loss of revenue through production outage; and

ii) Minimisation of flaring of associated gas caused by production outage

g) The Licensee shall provide a detailed breakdown of the operating cost forecast covering all cost categories, including, but not limited to: operations, maintenance, inspection, intervention, chemical consumption, well workovers, offshore operations, technical support, commercial support, management, general and administrative costs, onshore operations, infrastructure: supply base, vessels and intervention fleet and the cost of the FPSO leases. The cost breakdown shall be provided for both Liza-Phase 1 and Liza Phase 2 Development Plans in order to fully understand project cost and to assess the potential cost saving synergies that are available.

h) The Licensee shall identify all operating cost synergies that are available from operating Liza Phase 1 and Liza Phase 2 in parallel. If the Licensee contends that cost synergies are unavailable, then the Licensee shall provide a justification for any absence of cost synergies.

i) The Licensee shall identify all opportunities available for local content in the fabrication requirements of the Liza Phase 2 Development – the FPSO, subsurface facilities and supporting services. The Licensee must identify components of fabrication that can be performed using local content and detail plans for the Licensee to develop the capacity for such local content.

j) The Licensee permits the Guyana Civil Aviation Authority (the "**GCAA**") to install, operate and maintain one Automatic Dependent Surveillance-Broadcast (ADS-B) ground receiver station and a Very High Frequency (VHF) Radio repeater station on the Liza Phase 2 FPSO. The GCAA and the Licensee, in consultation with the Department of Energy, shall jointly develop, document and comply with the details and responsibilities associated with the said installation, operation and maintenance of the ADS-B and VHF Radio station, in keeping with applicable laws.

k) The Licensee shall perform the Confirmatory Studies detailed in Annex B, hereto attached and forming a part of this Approval, within twelve (12) months of the Approval Date and submit the completed studies to the Department of Energy, together with a documentary assessment of any implications for, impacts on or any due considerations regarding the Liza Phase 2 FDP.

3. Unless the context otherwise requires, the terms and expressions used in this Approval shall have the same meaning as in the Licence. Nothing herein amends or modifies the Petroleum Agreement.

Remainder of page intentionally blank, signature page follows

IN WITNESS WHEREOF, I, **President David A. Granger**, the Minister responsible for Petroleum, have granted this Approval and set my hand and affixed my seal, and Esso, as Operator on behalf of Licensee, has set its hand and affixed its seal as of the day, month and year herein below written, to be deemed approved as of the Approval Date and effective as of the Effective Date.

Signed:

The Minister Responsible for Petroleum representing the Government of the Co-operative Republic of Guyana

Witnesses:

1. _____
Name: Mark Byrne

_____

_____

Date: 2019.05.20

2. _____
Name: MATTHEW WILKS

_____

His Excellency David A. Granger
President of the Co-operative Republic of Guyana and Minister responsible for Petroleum.

DEEDS REGISTRY GUYANA

Signed:

Esso Exploration and Production Guyana Limited.

Witnesses:

1. _____
Name: STEVEN LAWS

_____

_____

Date: 20 MAY 2019

2. _____
Name: Deedra Moe

_____

Rodney D. Henson
President.

PENELOPE WHYTE NOTARY PUBLIC GUYANA

A TRUE COPY of the original which was registered in the Deeds Registry of Georgetown, Demerara, Guyana on the 17th Day of June 20 19

Assistant Sworn Clerk

17-06-2019

20th May, 2019

ANNEX A

Development Plan Addendum: Liza Phase 2

Containing:

(1) GYLZ-ED-BPRDE-00-0002, Liza Phase 2

ANNEX B

Confirmatory Studies

1. Resource Verification

   (a) A study to include velocity model-related uncertainty in the multi-scenario probabilistic analysis to improve the resource assessment.

2. Drilling

   (a) A study that identifies Comprehensive Hazard Identification (HAZID) and Hazard and Operability (HAZOP) Studies consistent with As Low As Reasonably Practicable (ALARP) principles or the equivalent terminology as used by EEGPL.
   A study that detail underlying assumptions, data, standards and models used to arrive at the drilling and completions design presented in the FDP, together with the identification of any critical gaps in either the models or the data and a plan for dealing with such gaps in analysis capability, including the planning, collection and subsequent assessment of further field data.

   (b) A study that verifies critical calculations by repeating and challenging the well designs and drilling and completion installation feasibility assessments. Such study should include sensitivity analyses, where these can be defined within the scope of uncertainty in the available field data. In particular, the limits of the present design should be critically assessed by testing more critical well paths and flow conditions beyond the currently planned scope of Liza Phase 2 wells.

   (c) A study to develop a fuller understanding of the in-situ geomechanics conditions, especially regarding the state of in-situ stress, its orientation and variability across all reservoir units and over all relevant depths and in the overburden layers, with a focus on critical issues of well stability in high angle wells and upwards containment of water induced fractures.

   (d) A study to verify the currently estimated value for the Shmax/Shmin ratio of 1.05, in relation to variation in rock material properties across the field using additional data collection (Formation Microimager (FMI) logs, calliper logs, borehole breakout observations, Extended Leak Off Test (ELOT) analysis etc)

   (e) A study to review the waterflood fracture modelling, its relevance in defining consistent input to the reservoir simulator needs and the reliability of ensuring stable numerical coupling of these two different models and so removing the possibility for gross errors in injection performance and consequent impact on the well completion design

   (f) A study to accurately assess the orientation of water induced fractures and their communication with the selected horizontal well azimuths in the injection interval and possible effects of fracture interaction.

(g) A study to demonstrate planned future step rate tests in water injection wells with sufficiently large injection steps to permit development of near wellbore pressure transients to allow accurate interpretation of fracture parting pressure, in so far as it may be affected by poro-thermo-elastic stress changes induced in the formation. Such tests should be accompanied by pressure fall off tests to provide accurate measurements of the fracture closure pressure under waterflood conditions.

(h) A study to determine the poro-elastic constant from such field observed changes in Shmin relative to corresponding changes in pore pressure and comparison made with laboratory measurements of the poro-elastic constant on representative core material under simulated downhole conditions.

(i) A study to assess the possible mechanisms for, and likelihood and consequences, of SAS and OHGP failures in terms of increases in sand production rate leading to equipment erosion and a consequent need to conduct well interventions to avoid a catastrophic failure.

(j) A study of critical aspects of the chemical injection procedures, starting with a review of the modelling criteria used for determining conditions for asphaltene, scale and hydrates formation in the well completions. Consideration to be given to performing independent testing so as to provide additional validation of the proposed configuration and operational control and expected performance of the proposed chemical injection system.

(k) A study examining the proposed Annulus Pressure Build-up Management Plan, to determine with greater confidence whether this can be eliminated as a potential source of an internal blowout resulting from direct pressure communication with the formation via the open shoe to the 133/8in casing.

(l) A study to further assess the possibility of encountering sufficiently large pockets of natural methane gas hydrate embedded in the MTC in relation to the risk that such deposits might pose for causing casing collapse as a result of dissociation and consequent gas pressure build-up in a constricted space behind the casing, caused by rising formation temperature in contact with wells under production conditions.

(m) A study to demonstrate a robust approach to monitoring and effectively dealing with presently outlying risks, such as possible gas driven condensate-like banking and water block affecting production well inflow performance, possible failure of ICDs to provide proper regulation of injection rates to induce separate fractures at different points along horizontal open hole sections and any possibility that accumulation of gas could enhance the degree of reservoir souring resulting from water injection.

(n) A study that documents the contingency plan to evaluate the likelihood, cost and potential HSE impact of deviations from the singular plan set out in the FDP, notably:

i. To deal with water injector failure for whatever reason, including loss of injectivity and sweep efficiency due to poor understanding of local in-situ stress and other possible unexpected reservoir conditions,

ii. Unexpected and insurmountable difficulties and cost overruns when drilling and completing high angle wells through the MTC,

iii. Unexpectedly high occurrence of chemical injection or sand exclusion system failure resulting in more frequently than expected well intervention or premature well abandonment,
iv. A coherent strategy for evaluating and effectively dealing with blowout risks, especially as these might relate to the optimal setting depth of the SSSV and suspension valve, as well as other modifications that may consequently be required to the completion design and SURF equipment (wellhead design etc),
v. A more extensive risk assessment relating to the availability and logistics of key and also expensive well intervention equipment, such as MODU vessels and capping stacks, and including focus on defining a more thorough relief well drilling plan.

4. Subsea Facilities

(a) A study on wellhead structures which examines the through life (drilling, completing, workover phases) static and dynamic performance of the wellhead and upper conductor section, that meets the ALARP standard to prevent blowout.
(b) A study to ensure that the inclusion of the proposed wellhead tubing head spool delivers the most structurally lower risk and lower cost option for providing tubing hanger orientation and flowline connection interface orientation.
(c) A study to more precisely define the technical justification and suitability of the Liza riser system.
(d) A study to confirm the use of subsea MPFM's as appropriate devices from which to provide the fundamental performance data for managing the reservoir, individual wells and the WAG switchover functionality, that such devices can operationally survive the Liza Phase 2 specific production fluids and that mounting the flow meters on the rigid jumper spools is the most operationally appropriate location for such.
(e) A study to ensure the proposed subsea system meets the ALARP standard for oil spill risk. As a comparison a template-based solution for development of Liza 2 should also be assessed.
(f) A study to ensure the proposed subsea wellhead connection system does not provide a sand plugging risk introduced by the vertical connection geometry which in turn, would lead to significant operational flow assurance degradation and remediation cost risks.
(g) A study of the field-life costs of a cluster vs a template-based solution for the Liza Phase 2 development to confirm which option is most cost effective and which provides the highest degree of thermal insulation to reduce hydrate plugging propensity in align with ALARP principles.
(h) A study to justify the x-mas tree type selection proposed (VXT vs. HXT) based upon delivering the structural, functional and operational requirements.
(i) A study to evaluate the pigging frequency and stuck pig plugging propensity introduced by the predicted sand production and its accumulation estimates within the SURF facilities.

5. FPSO

(a) A study into improving the accuracy of the Topsides metering systems.
(b) A study to confirm the gas handling capacity for simultaneous gas lift, export and injection.
(c) A study to confirm the ability of the TEG dehydration system to reliably meet the specification whilst minimising TEG carryover.

GUYANA

COUNTY OF DEMERARA

AFFIDAVIT OF DUE EXECUTION:-

I, **MARK BYNOE**, of Shiv Chanderpaul Drive and Charlotte Street, Bourda, Georgetown, Guyana, being duly sworn make oath and say as follows:-

1. I am one of the persons subscribed as a witness to the **Approval of Development Plan (Addendum) – Liza Phase 2 Development Plan**, executed on the 20th day of May, 2019, (the "Approval") a copy whereof is annexed hereto.

2. On the 20th day of May, 2019, I saw His Excellency **DAVID A. GRANGER**, **President of the Co-operative Republic of Guyana** and **Minister responsible for Petroleum**, duly execute the Approval.

3. The signature "**MARK BYNOE**" subscribed as a witness to the Approval is of my true and proper handwriting.

Sworn to at Georgetown, Demerara,)

This 20th day of May, 2019,)

Before me,)

MARK BYNOE

A COMMISSIONER FOR OATHS)

PENELOPE WHYTE NOTARY PUBLIC GUYANA

DEEDS REGISTRY GUYANA

GUYANA

COUNTY OF DEMERARA

AFFIDAVIT OF DUE EXECUTION:-

I, **MATTHEW WILKS**, of Shiv Chanderpaul Drive and Charlotte Street, Bourda, Georgetown, Guyana, being duly sworn make oath and say as follows:-

1. I am one of the persons subscribed as a witness to the **Approval of Development Plan (Addendum) – Liza Phase 2 Development Plan**, executed on the 20th day of May, 2019, (the "Approval") a copy whereof is annexed hereto.

2. On the 20th day of May, 2019, I saw His Excellency **DAVID A. GRANGER**, **President of the Co-operative Republic of Guyana** and **Minister responsible for Petroleum**, duly execute the Approval.

3. The signature "**MATTHEW WILKS**" subscribed as a witness to the Approval is of my true and proper handwriting.

Sworn to at Georgetown, Demerara,)

This 20th day of May, 2019,)

Before me,) **MATTHEW WILKS**

A COMMISSIONER FOR OATHS)

PENELOPE ANTOINETTE NOTARY PUBLIC GUYANA

DEEDS REGISTRY GUYANA

GUYANA

COUNTY OF DEMERARA

AFFIDAVIT OF DUE EXECUTION:-

I, **STEVEN RICHARD LAWS**, of 99 New Market Street, North Cummingsburg, Georgetown, Guyana, being duly sworn make oath and say as follows:-

1. I am one of the persons subscribed as a witness to the Approval of Development Plan (Addendum) – Liza Phase 2 Development Plan, executed on the 20th day of May, 2019, (the "Approval") a copy whereof is annexed hereto.

2. On the 20th day of May, 2019, I saw **RODNEY DALE HENSON**, duly execute the Approval.

3. The signature "**STEVEN RICHARD LAWS**" subscribed as a witness to the Addendum is of my true and proper handwriting.

Sworn to at Georgetown, Demerara,)

This 21 day of May, 2019,)

Before me, **STEVEN RICHARD LAWS**

Commissioner of Oaths
Ramesh Persaud
Lot 1 Croal St., Georgetown
to Affidavits

A COMMISSIONER FOR OATHS)

DEEDS REGISTRY
GUYANA

GUYANA

COUNTY OF DEMERARA

AFFIDAVIT OF DUE EXECUTION:-

I, **DEEDRA MOE**, of 99 New Market Street, North Cummingsburg, Georgetown, Guyana, being duly sworn make oath and say as follows:-

1. I am one of the persons subscribed as a witness to the **Approval of Development Plan (Addendum) – Liza Phase 2 Development Plan**, executed on the 20th day of May, 2019, (the "Approval") a copy whereof is annexed hereto.

2. On the 20th day of May, 2019, I saw **RODNEY DALE HENSON**, duly execute the Approval.

3. The signature "**DEEDRA MOE**" subscribed as a witness to the Addendum is of my true and proper handwriting.

Sworn to at Georgetown, Demerara,)

This 21 day of May, 2019,) Deedra Moe

Before me,) **DEEDRA MOE**

Commissioner of Oaths
Ramesh Persaud
Lot I Croal St., Georgetown
to Affidavits

A COMMISSIONER FOR OATHS)

DEEDS REGISTRY
GUYANA