ケニア共和国

ケニア地熱開発公社(GDC)

ケニア国

地熱開発のための能力向上プロジェクト

業務完了報告書

2020年2月

独立行政法人 国際協力機構(JICA)

西日本技術開発株式会社

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略語表	

略語	正式名称		
ABI	Acoustic Borehole Imager		
AFD	French Development Agency		
AfDB	African Development Bank		
C/P	Counter Part		
CPS	Corporate Planning & Strategy Department of GDC		
DDR	Daily Drilling Report		
EIB	European Investment Bank		
GDC	Geothermal Development Company		
GEOSTEP	GEOSTEP Consulting and Services Ltd		
GOE	Geothermal Engineering Co., Ltd.		
GRA	Geothermal Resource Assessment Department of GDC		
GRM	Geothermal Resource Management Department of GDC		
GSL	Global Synergy Link Limited		
HSE	Health Environment & Safety		
H/R	Human Resource Development Department		
IADC	International Association of Drilling Contractors		
In-SAR	Interferometric Synthetic Aperture Radar		
IPP	Independent Power Producer		
JCC	Joint Coordinating Committee		
JICA	Japan International Cooperation Agency		
JICS	Japan International Cooperation System		
JRI	The Japan Research Institute, Limited		
KCS	Kenya Chemical Society		
KENAS	Kenya Accreditation Service		
KENGEN	Kenya Electricity Generating Company Limited		
KES	Kenya Shilling		
KIC	Kyushu Electric Power International Co. Inc.		
KPI	Key Performance Indicator		
KYUDEN	Kyushu Electric Power Industry Co., Inc.		
LCPDP	Least Cost Development Plan		
LiDAR	Light Detection and Ranging. A digital 3-D mapping method that measures distance to a target by illuminating the target with laser light and measuring the reflected light.		
MEQ	Micro Earthquake Monitoring		
MMTEC	Mitsubishi Materials Techno Corporation		
MOEP	Ministry of Energy and Petroleum		
MRI	Mitsubishi Research Institute Inc.		
MT	Magnetotellurics		
MW	Megawatt		
NMCC	Nittetsu Mining Consultants Co. Ltd.		
O&M	Operation and Maintenance		
OJT	On the Job Training		
PDM	Project Design Matrix		
PO	Plan of the Operation		
PPA	Power Purchase Agreement		
RIMBase	Drilling operation and materials reporting system designed by IADC for integrating data from the several different drilling operation		

略語	正式名称
ROP	Rate of Penetration
SHE	Safety, Health & Environment of GDC
SKE	SK Engineering Co., Ltd.
SMBC	Mitsui Sumitomo Banking Corporation
SREP	Scaling Up Renewable Energy in Low Income Countries Program
SSA	Steam Supply Agreement
Thermaprime	Thermaprime Drilling Co.
TDC	Teiseki Drilling Co., Ltd
TOR	Terms of reference
USAID	United States Agency for International Development
USTDA	United States Trade and Development Agency
VBA	Visual Basic
WB	World Bank
WEST JEC	West Japan Engineering Consultants Inc.
YEC	Yokogawa Electric Corporation

第1章 業務の全体概要

1.1 背景

ケニア国における電力系統の総発電設備容量は1,593MWであり、2011年6月の時点で水力 発電からの電力供給で約48%賄われている。しかし、2011年3月のピーク需要は1,294MW、 2012年1月のピーク需要は1,211.9MWであるのに対し、水不足により実際に供給された電力 は1,194MWであった。ケニア国の電力開発計画である「最小費用電源開発計画: Least Cost Power Development Plan(以下 LCPDP)」によると、20年後の電力需要は12,738MW~22,985MW に増加することが予想されている。ケニア国の電力需要は年間8%増加しており、現在その約 50%は天候や干ばつに影響を受けやすい水力発電に依存している。この状況下でケニア政府 は豊富な地熱資源に着目し、二酸化炭素の排出量が少なくかつベースロード電源に適してい る地熱発電を20年間で5,530MWにまで拡張する計画をLCPDPに盛り込み進めている。

この目標に向けて、ケニア政府は地熱開発を加速するため、2008年に政府の特別目的会社 として GDC を設立した。GDC の基幹業務として設定されたのは、ケニア国のすべての地熱 資源の開発である。現在 GDC はこの開発プログラムの基で、Olkaria 地熱地点における KenGen との掘削契約の監修における生産井掘削工事、Menengai 地熱地点(Nairobi から北西約 150km)、 Baringo 湖北部に位置する Paka/Silari 地熱地点やケニア国内各地にある地熱地点の探査、調査 井掘削、開発のための地熱井掘削工事を実施している。このプログラムの資金はケニア政府 をはじめ、フランス開発庁(AFD)、アフリカ開発銀行(AfDB)、世界銀行(WB)、欧州投資銀行 (EIB)、低所得国の再生可能エネルギー増加(SREP)、米国貿易開発庁(USTDA)、米国国際開発 庁(USAID)などの開発パートナーによって支援されている。しかし、これらの開発パートナー からの十分な資金の支援にもかかわらず、GDC は掘削ターゲットの選定、掘削ターゲットの 掘り当て、地熱資源の評価などにおける能力が不十分であると判明した。以上のような現状 を鑑み、GDC の能力向上の課題に対して、開発リスクを軽減する事を目的とし、ケニア政府 は、「地熱開発のための能力向上プロジェクト」(以下プロジェクト)を日本政府に要請し、2013 年に実施計画を承認した。

1.2 業務概要

本プロジェクトは、2018 年 4 月に改訂・承認された PDM Version 2 に基づき実施されてきた。

PDM Version 2 は添付資料 2 に示す。

1) プロジェクト期間:

2013年9月から2020年3月 (6年6ヶ月)

- 対象地域: Nairobi、Nakuru、Naivasha、Menengai地熱地点
- 3) 上位目標:
 GDCが電力事業者に対して適切に蒸気供給を行うことができる。
- 4) プロジェクト目標:

地熱開発上の技術面でのリスクが低減されるべく、GDCの人材が育成される。

- 5) 成果:
 - 成果1:GDC 職員の能力開発に必要なトレーニングプログラムが構築される。
 - 成果2:貯留層の概念モデルの開発や適切な掘削地点を選定する能力が改善される。
 - 成果3:掘削ターゲットを掘り当てる能力が改善される。
 - 成果4:坑井データの解析、貯留層モデルの構築・較正及び貯留層評価に関する能力 が改善される。
 - 成果5:蒸気供給者として経済面や環境面から適切な事業計画を策定する能力が向 上する。
 - 成果6:地熱エネルギーの多目的利用事業実施に関する能力が向上する。
 - 成果7:GDC 内部に継続的に研修を実施・改善する体制が整う。

【成果1】に関する活動: 1-1: GDC の人材育成計画と職員の能力に関する現状調査 1-2: GDC が抱える課題の抽出と改善策の取りまとめ 1-3: GDC 経営層への提言とトレーニングの方向性の決定 1-4: トレーニングプログラムの計画 1-5: トレーニング用の教材の作成

1-6: 地熱開発に必要な技術能力チェックリストと評価表の作成

1-7:ベースラインの特定と目標水準の設定

【成果2】に関する活動:

- 2-1: 概念モデル構築に関するトレーニング
- 2-2: 掘削地点選定に関するトレーニング

【成果3】に関する活動:

- 3-1: 掘削作業に関するトレーニング
- 3-2: 掘削関連機材の調達・ロジスティクス管理に関するトレーニング
- 3-3: 健康・安全・環境 (HSE) に関するトレーニング
- 3-4: 掘削技術の理論に関するトレーニング

【成果4】に関する活動:

- 4-1: 坑井データの解析に関するトレーニング
- 4-2: 貯留層評価に関するトレーニング
- 4-3: データベースの構築・管理に関するトレーニング

【成果5】に関する活動:

- 5-1:環境モニタリングと環境計画に関するトレーニング
- 5-2: プラントエンジニアリングに関するトレーニング
- 5-3: 官民連携スキームの構築に関するトレーニング
- 5-4: IPP との合意形成・交渉に関するトレーニング
- 5-5: 電力事業者と協議(仮称意見交換会)

【成果6]に関する活動:

6-1: ケニアの地熱有望地点で適用可能な地熱エネルギー多目的利用事業の特定

- 6-2: パイロットプロジェクトの計画に関するトレーニング
- 6-3: パイロットプロジェクトの実施に関するトレーニング

【成果7】に関する活動:

- 7-1: 作成したトレーニング用教材とプログラムの課題の抽出
- 7-2: トレーニング用教材の改定とトレーニングプログラムの改善
- 7-3: GDC トップマネージメントへの改訂版トレーニングプログラムの提言及び GDC の人材育 成方針の再確認
- 7-4: トレーニングプログラムの人材開発プログラムへの統合

1.4 業務実施における基本方針

GDC の責務は、ケニア国の地熱資源の賦存状況を明らかにして資源リスクを担保すること により、海外 IPP 事業者を含む発電事業者の投資の促進と、地熱エネルギーの多目的利用事 業の促進促進である。本業務は GDC の地熱資源の探査・評価・開発を行う能力を高め、経済 的リスクを管理可能な範囲で事業者との契約に規定された地熱流体の供給能力を向上させる ことを目標としている。

特記仕様書によれば、本業務の実施により期待される成果は以下の7項目とされている。

- 成果1:GDC 職員の能力開発に必要なトレーニングプログラムが構築される。
- 成果2:貯留層の概念モデルの開発や適切な掘削地点を選定する能力が改善される。
- 成果3:掘削ターゲットを掘り当てる能力が改善される。
- 成果4: 坑井データの解析、貯留層モデルの構築・較正及び貯留層評価に関する能力が改善 される。
- 成果5:蒸気供給者として経済面や環境面から適切な事業計画を策定する能力が向上する。
- 成果6:地熱エネルギーの多目的利用事業実施に関する能力が向上する。
- 成果7:GDC 内部に継続的に研修を実施・改善する体制が整う。

上記 7 項目を作業や技術分野などとしてやや大きく分類すると、以下の 5 種類に分けられる。

- ① トレーニングプログラムの構築(成果1)
- ② 地熱資源の初期探査・評価技術のトレーニング(成果2)
- ③ 地熱井掘削技術のトレーニング(成果3)
- ④ 地熱資源開発の事業化に係る各種分野技術のトレーニング(成果4、5、6)
- ⑤ 継続的な能力向上・維持のための体制構築(成果7)

これらの各々について、業務実施のうえで有効かつ効果的な作業を実施できるよう、技術面での業務実施方針を以下に述べる。また、業務全般での運営面に関する方針を末尾に述べる。

トレーニングプログラムの確立(成果1関連)

ケニア国のエネルギー・天然資源利用に関する政策に沿った GDC の責務や能力を把握する ために、GDC 上層部・人事部・各技術部門のマネージャーと意見交換を行った上で、国の関 係当局へのインタビューも行う。これらの意見交換・インタビューの結果は、本提案書で提案 する成果2~6を得るための活動計画を改善する骨格となる。GDC 上層部との意見・情報交 換は、6年間のプロジェクト全期間を通じて随時実施することとし、トレーニングのプログラ ムとその成果を都度評価して、必要に応じてプログラムを修正できるようにする。この活動 の結果をベースに、成果2~6に係る活動に必要な教材・プログラムを、視聴覚教材も含めて 作成・改訂し、プロジェクトの終了時には、成果7として GDC が次世代の人材としての地球 科学者やエンジニアを自助努力により育成できるようにする。

地熱資源の初期探査・評価技術のトレーニング(成果2関連)

GDC にとって能力向上の必要性が最も高いのは、生産井・還元井の掘削成功率を向上させ、 地表設備による地熱流体輸送システムを最適化することによって、蒸気・熱水の供給コスト を低減することである。そのためには、適切な掘削位置を選定することに対する 2 方面から のアプローチが必要と考えられ、それらは①掘削ターゲットとして最良の地下条件が得られ ること及び②そのターゲットを掘削できる最良の地表での位置が選定されることである(傾 斜掘削「Directional Drilling」 により、掘削ターゲットは坑井基地の直上にある必要はない)。 ①のアプローチにおいて、地下に関するすべての情報(初期探査段階では主に各種の地表探 査データ)を統合することで地下条件を適切に推定・モデル化することが必要となる。 ②のア プローチには、地表の自然環境条件(将来の開発により影響を与えられる可能性のあるもの)、 地形条件、既存のインフラ、立地上の潜在的リスク(土砂崩れや火山噴火など)のマッピング などに関する知識が必要となる。地下条件及び開発可能な地表の範囲に関する基礎的な条件 が明らかになれば、坑井の生産・還元に関する特性や発電ポテンシャルの予備的な推定、プロ ジェクトの規模、開発コスト、経済財務条件の予備的な評価を行うことが可能となる。これら に関する適正な技術を持つことにより、GDC は、成功率を高めるとともにコストを最小限と できるような掘削ターゲットと坑井基地の選定が可能となる。GDC がそのような能力を得ら れれば、多数の地熱地点においてその技術の適用による評価が可能となり、開発優先順位を 含むケニア国全体での地熱資源開発計画を策定できるようになる。

成果2を目的とした活動は、主にケニア国内で実施する OJT として計画された。トレーニ ングは、OJT の主たる対象とする 2 つの地熱地点において、2 年間ずつ二期でそれぞれの実 施を予定した。第一期のトレーニングでは講義を含めた地熱探査・評価技術の指導を重点的 に行い、第二期では指導した技術が GDC により十分に活用できるものとなっているかどう かを確認するための監督を行うことがほとんどとなった。このトレーニングにおいて OJT が 実施される可能性がある地熱地点は Silali 及び Suswa であるが、最終的な決定は GDC 上層 部との協議を通じていた。第一期のトレーニングの初期段階では、トレーニングの目的と活 動を説明するための講義形式による研修を行い、その後、各々の分野の調査・探査に関して、 実際の地熱地帯において必要なデータ・情報を精度良く取得する手順・方法を OJT により指 導した。GDC のエンジニアが現地作業を適切に行えるようになれば、その後の作業は GDC により実施し、プロジェクトチームの専門家は帰国する。現地作業及び採取試料の分析など が完了した時点で、専門家は再びケニアに戻り、データ解析とそれらの統合による地熱系概 念モデルの構築、最有望な掘削ターゲット及び地表での掘削位置の選定、さらに発電可能な 規模やその開発コストの試算などに関する指導を行うことを予定した。第二期のトレーニン グでも同様のプログラムを繰り返し行うこととするが、探査作業やデータ解析・評価は GDC の技術者が主導的に実施し、専門家はその監督を行う。このような反復を伴うトレーニング により、指導した技術がより定着することを狙った。

地熱井掘削技術のトレーニング(成果3関連)

地熱開発における重要な技術の一つには適正な地熱井掘削作業がある。適正な掘削作業では、 正確に効率的に掘削ターゲットを掘り抜くことを、掘削リスク(坑内崩壊や掘管の抑留事故 など)を回避するとともに、作業の安全を確保しつつ、最小の時間と資機材により実施するこ とが求められる。掘削技術に関するトレーニングでは、坑井の仕上げ計画、必要な資機材・ス ペアパーツの調達・保守、掘削クルーの体制計画、掘削作業計画、作業場での安全衛生・環境 管理などの広範囲の技術が対象となる。理論及び掘削シミュレーションについての講義やデ ィスカッションはGDCのNakuru事務所で実施され、実務や技能に関わる OJT は主に Menengai 掘削地点で実施された。

この OJT では、適切な資機材の使用、坑内の掘削用機材の回収(フィッシング)技術、掘削 中の各種データ取得のためのセンサーやレコーダーの保守、安全管理プログラムの確立、傾 斜掘りなど、最新の掘削技術に関する紹介や知見の技術移転が含まれる。これらの中で、掘削 中にカッティングスが通常より除去ができない事から、GDC は適切ではない方法でフォーム ドリリング(界面活性剤などを利用する掘削工法)作業を実施しており、この点において重要 な課題の一つとして挙げられた。またカッティングス除去の改善のため、泥水掘削技術も OJT に導入した。本活動のため泥水掘削技術の効果を示すため、JICA より泥剤が供与され、泥水 エンジニアリング、泥水循環システム、及び演習を実施した。本泥水掘削演習を通して GDC は坑内のカッティングス除去の重要性とその方法を認識し、トレーニングとして大きな成功 を収めた。

地熱資源開発の事業化に係る各種分野技術のトレーニング(成果4、5、6関連)

特記仕様書に示された期待される成果4、5、6は、GDC が、地熱地点の開発可能量、貯 留層への影響のより少ない最も適した発電技術、地熱エネルギーの多目的利用を含む地熱流 体供給のコストや経済・財務性を判断する能力を獲得することを目的とする意味で、地熱資 源開発の事業化に関連した各分野に係るトレーニングが求められていた。GDC がこれらの能 力を獲得することで、少なくとも 30 年間にわたり地熱貯留層と流体供給施設を維持管理する とともに、新規の地熱地点の開発を継続することが可能となるだけの十分な収益を上げられ る条件で、IPP と蒸気供給契約を交渉できる能力を向上させることを目的とした。さらに、地 熱流体を発電に利用した後に多目的利用することができるようになれば、GDC は追加的な収 入を得ることも可能となる。

本トレーニングのうち、成果4に係る活動は第一期から第二期を通じて、成果5・6に係る

活動は第一期のみで実施された。

貯留層評価についてのトレーニング(成果4関連)は2種の活動に分類される。その一つは、 精度の高い坑井試験データの取得に関するものであり、Menengai地点の既存もしくは新規に 掘削される坑井を利用した OJT であった。もう一つは、取得された各種データを用いた地熱 系の数値モデル化による貯留層評価技術(3 次元シミュレーション解析)に関するものであ り、主に本邦研修により実施した。数値モデルの基となる地熱系概念モデルは、成果2及び3 に係る活動で得られたものを利用し、Menengai地点のデータ類を対象とした。貯留層評価技 術に係るトレーニングにおいては、最適な開発規模やスケジュールを選定するために、数値 モデルを用いた複数の異なる開発シナリオのシミュレーションを実施した。なお、開発シナ リオの最適化にあたって、研修は本邦で貯留層評価技術に加えて、地熱流体の輸送に係る地 上設備のエンジニアリングや、貯留層への影響の度合いが異なる複数の発電方式についての プラントエンジニアリングに関する技術の指導も行い、貯留層への影響などを検証した。

成果5に係る活動には、環境保全関連、プラントエンジニアリング関連、蒸気供給者として の経営や契約に係る分野のトレーニングが実施された。

GDC の喫緊の課題として、IPP 事業者との蒸気供給契約(SSA)や他のオプションとしての 売電契約(PPA)の交渉・調整に係る能力として、様々なタイプの発電技術や蒸気供給のコス ト積算・経済財務評価、蒸気価格の戦略的設定などの知識・ノウハウを必要としていた。した がって、これらに関するトレーニングの殆どはプロジェクトの早期に実施された。

成果6に係る活動としての地熱エネルギーの多目的利用に関するトレーニングは、第一期に ケニア国内での講義を主体として実施し、発電所の余剰熱水などを用いた多目的利用のパイ ロットプロジェクトを GDC が Pre- F/S レベルの計画作成を行えるようトレーニング実施し た。

継続的な能力向上・維持のための体制構築(成果7関連)

成果7に係る活動としてのトレーニングプログラムや教材の作成を行った。プロジェクトの 遂行とともに、目標とする成果に対する効果的な技術移転ができているかをモニタリングし、 第一期終了時に中間レビューを開催した際、特に成果2,3,4について評価を行った。この 中間レビューの評価を基に、第二期のトレーニングプログラムが見直され、次のような活動 を実施した。

- a) トレーニングの実施とその成果を通じて明らかとなったトレーニングプログ ラム・教材の課題の整理
- b) 上記課題を考慮し、GDC が自らトレーニングを実施するに際しての注意点を 考慮した改定・改善
- c) GDC 上層部への GDC 人材育成方針の確認・レビューを行った上で、上層部 との協議の結果も反映したトレーニングプログラム・教材の提言
- d) 上記全ての GDC 人材開発プログラムへの統合

業務全般の運営面での方針

本業務でのトレーニング活動全般において、プロジェクトの柔軟性を確保するために、現地 作業時のみならず、国内作業時にも電子メール・電話、また必要に応じてテレビ会議を実施す るなど、GDCの関係者(特に上層部)と連絡を密にし、GDCの活動計画やその進捗を常に 把握することにより、トレーニングプログラムを適宜変更するようにして効果的な活動を可 能にした。

OJT を中心としたトレーニング活動においては、GDC の主体性を奪うことの無いよう、またトレーナーである専門家が実際の作業を行うことが無いよう、GDC 技術者自身に演習を実施させた。特に、成果2、3、4に係るトレーニングに関しては、第一期では模範演習を多用したが、第二期ではGDC 技術者が中心に作業を行い、専門家はアドバイスや注意を与える活動を中心とした。

なお、本プロジェクトにおける機材供与については、JICA から直接供与されるものと本業

務において調達・供与するもの(1,500 万円以下の機材)とに分けられるが、その両方について機材調達支援の専門家が支援・担当した。

1.5 業務実施の方法

業務実施の手順を「作業計画のフローチャート(第一期)」及び「作業のフローチャート(第 二期)」に示す。業務の方法については、特記仕様書に示された成果7項目に係る活動のそれ ぞれについて記載された。ただし、方法の詳細に関しては、GDC との協議に基づくトレー ニングプログラムの策定、すなわち成果1の結果に基づき決定された。

(1) トレーニングプログラムの構築(成果1)に係る活動

本トレーニングプログラムに関する活動の詳細については添付資料 6「成果1のフローチャート」に示す。本活動は主に本プロジェクト第一期の開始時から第2次国内作業にかけて実施した。

◆ 活動 1-1:GDC の課題と改善策

GDC のニーズに合ったトレーニングプログラムを計画するため、GDC の責務及び それを実行するための内部組織についてレビュー・評価を行った。そのレビュー・評価は、 主にエネルギー省と GDC 上層部へのインタビューを通じて行い、今後数年にわたる GDC の 業務範囲の見込みについて確認した。

◆ 活動 1-2:GDC の現状調査

すでに実施済みの「ケニア国地熱開発技術支援協力プロジェクト詳細計画策定調査」(以下 「技プロ詳細計画策定調査」と称する)において調査された GDC の人材や保有機材とその能 力の現状に関する情報を基礎とし、追加調査を行う。追加調査においては、予め準備した必要 追加情報のリストや質問表を用いて、GDC の組織としての評価は、GDC 人員体制(工事士/ エンジニアのカテゴリー化、教育レベル、特別な研修、経験年数、組織図、グループ間の関係) 及び活動をサポートするインフラ状況(図書館、特別機材、分析・研究所、修理工場、部品・ コンピューター機材及びスペアパーツの調達と購入)の各要素に関する調査を行った。この 調査において、以下の項目について GDC 内の異なる階層に対して、成果2~6に係る活動の 各分野を考慮したインタビューを行うことにより情報を得る。

- 1-2.1 GDC 上層部:人員とインフラの強化の目的と必要性
- 1-2.2 地質調査:概念モデル構築と掘削ターゲット選定のための人員能力とインフラ
- 1-2.3 地球物理探査: 概念モデル構築と掘削ターゲット選定のための人員能力とインフラ
- 1-2.4 地化学調査:概念モデル構築と掘削ターゲット選定のための人員能力とインフラ
- 1-2.5 掘削工事:掘削作業を行うための人員能力とインフラ
- 1-2.6 坑井試験、貯留層評価・管理:検層、坑井試験、貯留層数値シミュレーションを行うため の人員能力とインフラ
- 1-2.7 気水輸送設備:生産井から発電設備まで、またセパレータから還元井まで地熱流体を輸送 するための設備の建設・運転管理を実施するための人員能力とインフラ
- 1-2.8 発電プラント:様々なタイプの発電プラントの運転及び維持管理を監督するための人員 能力とインフラ
- 1-2.9 環境社会配慮: EIA の実施及び地熱開発の周辺環境へのインパクトについてモニタリン グする人員能力とインフラ
- 1-2.10 投資計画と経済性:活動計画、設備コストの概算、蒸気・熱水供給コストとその経済財務 評価に関する人員能力とインフラ
- 1-2.11 蒸気供給・売電契約:蒸気・熱水の供給、グリッドへの売電に関する IPP との交渉に関 する人員能力とインフラ
- 1-2.12 データベース: GDC のオペレーションに関する記録・データ蓄積を行う人員能力とイン フラ

1-2.13 地熱流体の多目的利用:地熱開発に関する地元住民のニーズ調査及び地元住民が社会経済的に裨益する産業利用計画を行う人員能力とインフラ

上記現状調査の結果を踏まえ、課題の整理と改善策を GDC 関係者との協議も通じて取りま とめた。

◆ 活動 1-3:ベースライン評価と目標レベルの設定 上記の理解を基に GDC の現状のベースラインを特定し、教材の作成や機材の供与を含む改 善策の実施を前提とした目標水準を設定する。これら作業には活動 1-4 で作成するチェック リストと評価表も参考とする。また、目標水準達成を目的としたトレーニングプログラムの 素案を作成した。

- ◆ 活動 1-4:GDC 経営層との調整 上記活動 1-2 の後に、GDC 経営層へ目標水準やトレーニングプログラム案について提言し、 トレーニングの方向性などについて意見交換・調整を行う。その際には、経営層や人事部門へ GDC の人材育成計画の確認も行った。
- ◆ 活動 1-5:トレーニングプログラムの作成 上記の活動により得られた全ての情報を統合し、トレーニングプログラムの最終版を取りまとめる。そのトレーニングプログラムはワークプランとして JICA へ提出した。

◆ 活動 1-6: チェックリストと評価表の作成 トレーニングプログラムの進捗や成果をモニタリングするためのチェックリスト及び評価 表を作成した。評価表は、GDC のテクニカルサービス部門をはじめとする各部署の地熱開発 関連の能力について、定量的な評価が可能なものとする。現時点では、各技術要素を含めたレ

ーダーチャートの作成を予定するが、最終的には GDC とも協議の上決定。

◆ 活動 1-7: トレーニング用の教材の作成

トレーニング教材として、トレーニングプログラムに適合したハンドブックが作成された。 一部のハンドブックは、プレゼンテーションや講義の資料を基に作成され、さらに視聴覚教 材も作成された。これらの資料はプロジェクト期間中継続的な改訂が繰り返され、プロジェ クトの終わりに完成した。

当初は全分野のハンドブック数を15巻で作成する計画だったが、添付資料12に示す通りプロジェクト終盤では41巻に増え、GDCに引き渡された。

◆ 活動 1-8: 資機材の調達

上記 1-2 の活動において必要と考えられる掘削用資機材や探査機器、分析機器、解析ソフト ウェアなどのリストを作成し、GDC とも協議の上その優先順位を決定し、本プロジェクトで の供与機材とした。供与資機材が決定次第、その調達を開始、本プロジェクト終了後にも GDC 自身で保守・管理できるよう、スペアパーツ・消耗品などに留意した。

(2) 貯留層概念モデル構築及び掘削地点選定の能力改善(成果2)に係る活動

概念モデル作成、掘削ターゲット選定、地熱資源量の予備的評価、開発の優先付けについてのトレーニングに関する活動の詳細について添付資料6「Objective 2 flow chart」に示す。

1.4 (2)の記載の通り、このトレーニングは、OJT の対象となる地熱地点を2 地点選定し、 各種の技術要素のトレーニングを2 度実施する計画だった。1 度目は第一期に実施される集 中講義と模範演習を含めた現場探査など、2 度目は第二期では GDC の実地演習を中心とした 反復演習となるトレーニングである。成果2に係る活動は、いわゆる地熱開発の Pre F/S 的な ものであり、これを通じて地熱地点の予備的な資源量評価や開発事業の経済財務評価が行わ れる。GDC は、開発の優先付けのためにコンセッションを有する全ての地熱地帯でこの類の 調査を実施した。この調査の成果として、地熱流体の開発費用(掘削深度、流体の輸送設備) の概算を行うために重要となる掘削ターゲットの選定が行われる。この活動におけるトレー ニングでは、GDC が地下のどのターゲットを目標に地表のどの場所から掘削を行うべきか決 定する能力をつけることを目的に行われる。しかしながら計画されていた北部の地熱地点で の治安状況により、第二期では再びメネンガイ地熱地点での OJT を実施せざるを得なかった。

- 地下条件は、地表探査(地質調査、地球物理探査、地化学調査、活動 2-1.1、特に活動 2-1.1.1 から 2-1.1.3)の結果を概念モデルに統合することによって決定される。地球科学的な手法 を取り入れた各種の資源調査は、地質調査では衛星画像解析・一般地質踏査・熱水変質帯 調査・岩石年代測定など、地化学調査では温泉水化学調査・噴気ガス化学調査・土壌ガス 調査など、物理探査では重力探査・電気探査・電磁法探査・磁気探査などに細分化され、 それらに必要な知識・技術の量は大きなものであり、且つどのような手法を組み合わせる かについても知見や経験が必要となる。
- 地熱系の概念モデル(添付資料6「Example of Conceptual Model」)は、すべての探査結果 を統合することにより地下条件を概念的に示したものであり、地熱流体の抽出に最も適し たエリアを明らかにすることを目的に作成される(活動 2-1.1.4)。
- 地表条件は、地形調査(活動 2-1.1.1)、環境調査(活動 2-2.1.2 及び 3)、既存インフラ調査 (活動 2-1.1.4)、自然被害(ハザード)調査(活動 2-2.1.5)の結果を統合することで決定される。これにより、発電所、坑井基地、地熱流体輸送設備などの安全な建設場所を決定することができる(活動 2-2.1.6)。
- 以上の結果を組み合わせることで、坑井基地と掘削ターゲットを決定できる(活動 2-1.1.5) (添付資料 6 「Example of drilling site selection」)
- これらすべてを行うことで、GDCは、発電能力の概略試算(モンテカルロ手法を用いた容積法などによる)が可能となり、Pre F/S報告書としてまとめることができる(活動2-1.1.6と2-1.1.7)。この段階で本プロジェクトの専門家は、開発を進めるかどうかについての議論の場に参加し、指導やアドバイスを行う(活動2-3)。GDCは、発電所の建設場所の決定(活動2-3.1)、生産井・還元井のキャパシティと必要な坑井の本数を推定するためのモンテカルロ法による解析を行い(活動2-3.2)、それに基づく発電所の概念設計及び予備的コスト積算を実施し(活動2-3.3)、予備的な経済性評価を行う(活動2-3.4)ためのトレーニングを受ける。探査などで得られたデータを利用しやすいよう取りまとめたデータベースの準備もトレーニングに含めた。
- この活動におけるトレーニングは、現存する地熱開発で採用されている基本的かつ標準的な技術でGDCの能力向上を焦点としている。しかし、Menengai地点の地熱貯留層の構造は、非常に異質であり、深部に位置しているため、明らかにすることが困難である。Menengai地点の東部の調査によると、カルデラ中心部と比較してそれほど集中していないが、広範囲に冷えた溶岩に覆われた東部のMW-18A 坑井が良好な井戸と判明し、JICA-GDC-MOEPはより多くの調査の実施でデータを収集することになった。プロジェクトでは、標準的な調査に加え、ABI(Acoustic Borehole Imaging)、In-SAR、LiDAR、コア採取などの高度な技術を適用することを提案された。これらの新しい技術項目の導入により、GDCの技術者向けにトレーニングが実施された。すべての調査及び研究結果は統合され、Steam Report に反映された。
- なお、地質調査・地化学調査のトレーニングにおいては、現在 GDC が保有する機器では 分析不可能な、水試料の同位体組成分析や岩石試料の年代測定について、データ取得のた

めの分析・測定を国内再委託で実施した。

(3) 掘削ターゲットを掘り当てる能力の改善(成果3)に係る活動

掘削技術に関するトレーニングの活動の詳細については添付資料6「Objective 3 flow chart」 に示す通りである。

地熱蒸気開発において多くの予算を担う掘削事業の成否は、GDC の経営に多大な影響を与 える。プロジェクト開始時、GDC は4 基の掘削リグを保有していたが、プロジェクト期間中 に新たに3 基の掘削リグを加え、Menengai 掘削地点を中心に掘削工事を進めた。掘削リグの 数を増したことにより、掘削工事の経験がほとんどない要員が新たに雇用され、機材の仕様 上の不備や保守管理の面などの問題を抱え、結果的に低い掘進率や工事の遅延が多発した。 この状況を改善するため、掘削要員の能力向上だけでなく、指揮並びに責任に関連する構造 の改善も必要と考えられた。一方で事業はあくまで GDC の責任において進められるものであ り、本プロジェクトで派遣された掘削専門家が GDC 掘削工事に直接指揮は出さず、GDC 技 術者への教育及び GDC のための教育計画の確立を目的としていたため、GDC の掘削工事に 関与せず、工事に関するアドバイスなどで改善を図った。掘削技術トレーニングの当初の計 画では、掘削エンジニアを対象に機材の保守整備及び管理、掘削計画策定に係るエンジニア リング、ロジスティクス及び安全教育の指導だった。これに加え、掘削現場での健康・安全・ 環境(HSE)や特に5S運動に関わるトレーニングも計画に含まれていた。活動の実施を進め るにつれて、トレーニングを受講する対象者の範囲を広げる必要が明らかになり、掘削技術 に関わるトレーニングプログラムは大多数の掘削要員が受けられるよう調整された。このた め掘削技術に関わるトレーニングは次の4方法で実施された。

- ① 掘削オペレーション、メンテナンス、安全、またはこれら項目に関連する掘削地点での OJT が挙げられる。また、プロジェクトの専門家が必要な掘削資機材を GDC の調達担 当部とともに調達に関わるプロセスを通じて供与、計画立案し支援した。主なトレーニ ングの対象者は、掘削エンジニアやシフトリーダーだったが、最終的に、掘削工事に従 事している大多数の掘削要員が受講した。
- ② 講義形式での技術移転が挙げられる。2016年と2018年にそれぞれ約5ヶ月間に亘り、 掘削エンジニア、シフトリーダー、機械技師や電気技師、安全担当者を対象に実施した。
- ③ 掘削エンジニア、管理者とプロジェクト専門家との間で掘削現場における指摘事項や運用上の課題についての2週間に一度の会議開催が挙げられる。これらのトピックに基づいて、掘削担当者のエンジニアと管理者にトレーニングを提供することを目的とした。
- ④本邦における研修が挙げられる。本研修は、Menengai 及び GDC PoloCenter での OJT を 補完するものであり、日本の地熱掘削専門家による掘削理論や最新の掘削技術に関する 講義、掘削現場やビット工場((株)TIX-TSK)及びバルブ工場((株)TIX-IKS)の訪問、 JOGMEC 柏崎施設における坑井制御訓練用のシミュレーターにおける演習などが盛り 込まれた。また、泥材メーカーの研究所おいて泥水に関わるトレーニングが実施された。 また HSE に関連した講習など外部に委託し、「玉掛け技能講習」を受講した際、受講者 は国から認定された正式な証明書が交付され、また福岡市消防局による救命救急講習な どを実施した。本邦研修における対象者は、エンジニア、シフトリーダー、機械技師や 電気技師などの技術者であり、1回6名の研修生を1ヶ月かける構成で本邦研修が実施 され、プロジェクト期間中本邦研修を受講した掘削技術者は合計でのべ48名となった。

現地掘削 OJT においては、Menengai 掘削地点で実施された。当初、日本人掘削アドバイザーは4名から成るチームを、一回の渡航を28日間のローテーションで3か月間実施し、このサイクルを3年間にわたり、冬季に実施する事を計画していた。現地掘削 OJT の3か月間に

おいては、世界一般的な掘削工事の1つの完全なサイクル、すなわち掘削機の立ち上げ、ス パッドイン、掘削工事の実施、坑井の完成、掘削機の撤収がカバーされるよう計画していた。 したがって、3年間にわたり、現地掘削 OJT が実施される期間で3つの掘削工事がカバーさ れる事を計画されていた。

しかし、GDC の掘削工事において、工事の長期的な中断などが頻繁し、坑井を1本掘り上 げるために3か月以上かかる事が判明し、当初の計画は現実的ではないことが明らかになっ た。これに伴い、季節的な制限が課せられず、より長期間現地でOJT が実施できるよう、掘 削専門家のチーム構成が見直された。さらに、教育の観点から、より一貫した技術方針が必要 であると考えられ、また言語要因も考慮され、単一の掘削会社の専門家がより効果的である と考えられた。このため、日本人のみで構成されていた掘削専門家の大部分は、2015年後半 より、フィリピンの Thermaprime 社の掘削専門家に変更された。

(4) 貯留層評価に関する能力の改善(成果4)に係る活動

地熱貯留層評価に関するトレーニングの活動の詳細については添付資料6「Objective 4 flow chart」に示す通りである。

GDC の主要事業は、蒸気を発電用にエネルギー変換する IPP 事業者に対して蒸気・熱水を 供給することである。GDC は、先に開発した地熱地点において蒸気・熱水を販売することに より、ケニア国内の他の地熱フィールドでの開発を含む持続的な地熱開発のための十分な収 入を得る必要がある。蒸気・熱水の値段は、貯留層のポテンシャルと開発の持続性に大きく影響されるが、これらは貯留層データの量と質、及びこれらのデータによる開発での貯留層へ の影響を予測する技術に左右される。また、開発の形態については、地熱発電方式(発電プラ ントのタイプ)にも依存する。これらについてのトレーニングは、第一期と第二期にわたり実 施され、現地作業に加えて本邦研修も実施した。本邦研修は、年1回(計4回)で6名の研 修員が招聘された。

貯留層評価などの理論についての一般的な説明は第一期にケニアで実施し、その後本邦研修 を通じて Menengai 地点のデータを用いた OJT による解析・評価の作業を行った。それらの トレーニングは、坑井データの取得(活動 4-1)、数値モデルによる貯留層シミュレーション (活動 4-2)、貯留層運用・管理(活動 4-3)という3つの主要な技術分野に分けられる。

◆ 活動 4-1: 坑井データの取得・解析

坑井データ取得に関するトレーニングは、坑内検層作業、掘削完了時の坑井試験、噴出試験 から構成される(活動 4-1.1 及び 4-1.2)。また、それらのデータの解析とその結果の地熱系概 念モデルへの統合についてのトレーニングも行った(活動 4-1.3)。

◆ 活動 4-2:数値モデリングによるシミュレーション

主に本邦研修において実施するトレーニングにおいて最も重要な点は、発電方式を考慮した 貯留層開発の最適化(活動 4-2, a~k)についてであるが、これは成果5に係る活動の一部(プ ラントエンジニアリングと IPP との合意形成・交渉に関するトレーニング)と組み合わせて 行われるべきである。

このトレーニングにより、GDC は貯留層の開発期間中に必要とされる、生産井、還元井及 び補充井の本数を推定することが可能となる。また、地熱系の数値モデルの作成方法とその 活用(シミュレーション解析)、地上設備と流体輸送設備のコスト概算を学習することにより、 これらすべての要素を考慮して、技術的にも経済的にも最適な開発シナリオを策定できるよ うになる。GDC の技術者には、演習としての報告書作成を実施させ、事業計画に関する意思 決定をどのように行うかについて指導を行った。

◆ 活動 4-3: 貯留層の運用・管理(O&M) 発電所運転開始以後の実際の地熱貯留層は、必ずしも数値シミュレーションの結果通りの変 動を示すわけでないため、その貯留層運用・管理期間中のモニタリング方法及びモニタリン グデータの解析技術に関するトレーニングを行う(活動 4-3, a~d)。

◆ 活動 4-4: データベースの構築・管理

各種坑井試験のデータやモニタリングデータ、さらには数値モデル構築に係るデータ類は膨 大なものとなる。したがって、それらを効率的に整理・格納し、貯留層の運用・管理段階にお いて効果的に利用できるようなデータベースの構築が必要である。このトレーニングでは、 それらのデータの関連性や評価における総合的な考察が可能となるよう、データベースの構 築及びその後の管理に関する講義や演習を行う。データベースに利用するソフトウェアとし ては、GDC からの指定に基づき GD Manager、Steam-Field Manager 及び Surfer を使用し、必 要に応じて他のソフトウェアも導入した。さらに、GDC 担当者が急速に進化するデータベー スソフトウェア環境に適応できるように、汎用データベース技術のソフトウェア理論と技術 についても指導した。

(5) 適切な事業計画を策定する能力の向上(成果5)に係る活動

環境モニタリング・環境保全計画、プラントエンジニアリング、官民連携スキーム PPP)の 構築や IPP との交渉などに係るトレーニングの活動の詳細については添付資料6「Objective 5 flow chart」に示す通りである。発電事業者 (IPP) に対して蒸気・熱水を供給することが GDC の責務であるが、蒸気を販売・購入する双方にとって win-win となるような公平で健全なビ ジネスを創出するためには、GDC は民間パートナーの立場やニーズを理解する必要がある。 これに関するトレーニングは、環境計画 (活動 5-1)、プラントエンジニアリング (活動 5-2)、 IPP-PPP スキーム (活動 5-3)の3 種に分類される。これらのトレーニングは、原則として第 一期に実施したが、GDC からの要望や GDC 事業の進捗などによっては第二期にも実施した。 理論・概念に関する一般的な説明は、第一期の初期にケニアにおいて短期間の講義形式で実 施した。活動 5-2 については、貯留層評価 (成果4 関連)の本邦研修において、Menengai 地 点のデータを用いて OJT 形式で実施した。

◆ 活動 5-1:環境モニタリングと環境保全計画

環境モニタリング・計画に関するトレーニングでは、建設段階(活動 5-1.1)及び運用段階 (活動 5-1.2)で考慮すべき点、さらに環境保全計画(活動 5-1.3)に係る点について考察する。 これらの概念は、発電事業の EIA 及び掘削・流体輸送設備のための EIA において詳細に取り 上げられるべきものである。このトレーニングでは、ドナー機関からの資金協力を得るため の各種環境社会配慮ガイドラインなどや、カーボンクレジットの取得に関係する講義も実施 した。

◆ 活動 5-2: プラントエンジニアリング

プラントエンジニアリングのトレーニングは、成果2 に係る活動(掘削位置選定)に関連した地上設備建設の位置に係る条件の検討に加えて、発電方式の選定(活動5-2.1)に関するもの、流体輸送方法の選択とその概念設計(活動5-2.2)に関するもの、及び、蒸気供給契約(SSA)で規定すべき発電所とのインターフェース(流体/電気/計装制御信号の取合い条件)に関する講義から構成される。発電方式の選定に関するトレーニングでは、背圧タービン、シングルフラッシュ、ダブルフラッシュ、熱水バイナリー、蒸気熱水併用バイナリー、コンバインドサイクル型バイナリーについて特徴を把握し、長所と短所を比較できるようにする。これらはすべて、現在及び将来において予測される地熱流体の熱力学的・化学的性状に基づいて検討されるべきものである。本邦研修におけるトレーニングは、貯留層開発の最適化(活動4-2)に関連して、対象地熱地点に適した発電方式を個別に比較することによって行われる。活動4-2 と 5-2 の成果により、発電方式別の地熱資源の開発コストと貯留層の運用に必要な生産井・還元井の初期本数及び補充井の必要本数について見積ることが可能となる。GDC は初期費用の概算及び経済財務評価の方法についてトレーニングを受けることで、GDC の内部収益率(IRR)の最大化に寄与できるとともに、次の活動5-3 において IPP-PPP スキームと PPAの制約の条件下における蒸気供給契約交渉の戦略に関するトレーニングの受けるためのベー

スを獲得した。

- ◆ 活動 5-3: 官民連携スキームの構築・IPP との合意形成・交渉
- 活動 5-3 に関しては、IPP 事業者の投資が促進される環境を維持しつつ、GDC と IPP 事業 者の双方の事業継続が可能となるような蒸気供給契約を締結できる能力の育成を図る。この ため、財務関する基礎理論やプロジェクト経済性評価手法の技術移転を実施した。プロジェ クト評価手法の技術移転においては、地熱発電プロジェクトの経済性評価モデルを構築し、 各種条件を変更した場合にプロジェクトの収益性がどのように変化するか習得した。なお地 熱発電プロジェクトの経済性評価モデルは、2 つの事業者(GDC と IPP 事業者)が存在する ことを考慮して、それぞれの収益性が評価できるようなモデルの構築を目指した(添付資料 6「Flow of Steam & Power Sales Price settings and its necessary knowledge and capacity」参照)。 さらに、IPP との合意形成に関しては、IPP 事業者及びその候補者となる企業などとの意見交 換会やインタビューを通じて要望や意見も聴取した上で検討された。
- (6) 地熱エネルギー多目的利用事業実施に関する能力の向上(成果6)に係る活動

地熱エネルギーの多目的利用に関するトレーニング活動の詳細については添付資料6 「Objective 6 flow chart」に示す通りである。

GDC は、地熱エネルギーは発電以外にも利用できることを認識しており、地熱エネルギー の地域産業への多目的利用の可能性について調査を行うグループを社内に設けている。地熱 の多目的利用の一例としては花卉栽培があり、この分野でケニアは世界的なリーダーとなっ ているが、他にも地熱の直接利用の可能性がある。

このような地熱多目的利用の促進に関する能力を向上させるために、本プロジェクトの第一 期において、どのような産業が地熱の利用により競争力のある製品を生み出すことができる かという市場調査・分析(スクリーニング)を GDC と共同で行う(活動 6-1)。それにより有 望と判断される熱利用プロジェクトをいくつか抽出し、それぞれで必要とされる熱量と、活 動 5-2 で検討される発電方式に応じた利用可能な余剰熱量とのマッチングを行う。この情報 に基づき、最も有望な産業を選定し、パイロットプロジェクトとしての計画を策定する。その パイロットプロジェクトに関し、必要設備の概念設計、事業費概算・経済財務評価に関するト レーニングを実施する(活動 6-2)。また、そのパイロットプロジェクトの実施に向けて、必 要なリソースの動員などに係る指導を実施した。

(7) 継続的に研修を実施・改善する体制の整備(成果7)に係る活動

成果2、3、4、5、6に関連した活動の期間中には、活動の予備的な成果についてのモニ タリングを行うことが必要である。モニタリングやその結果に対処されるべき点は以下の通 りである。

- a) トレーニングの実施とその成果を通じて明らかとなったトレーニングプログラム・教材の 課題の整理
- b) 上記課題を考慮し、GDC が自らトレーニングを実施するに際しての注意点を考慮した改 定・改善
- c) GDC 上層部への GDC 人材育成方針の確認・レビューを行った上で、上層部との協議の 結果も反映したトレーニングプログラム・教材の提言

d) 上記全ての GDC 人材開発プログラムへの統合

◆ 作成したトレーニング用教材とプログラムの課題の抽出 トレーニングの実施中、新しく生じたニーズや課題について注意を払う。これらのニーズや 課題にどう対処すべきか、その時点のプログラムの中で解決できる可能性があるのかを評価 し、将来的に GDC が解決すべき課題であればそのための提言を行った。

◆ トレーニング用教材の改訂とトレーニングプログラムの改善

GDC の取り組みは長期にわたるものであるため、本トレーニングプログラムを通じて、 GDC は次世代の地球科学技術者・エンジニアに対して同様のトレーニングを行えるレベルに 達する必要がある。トレーニングの実施期間中には、トレーニング用教材 (テキスト類とビデ オ映像) とトレーニングプグラムの内容についてレビューを実施し、トレーニング受講者が 効果的に概念を理解し、それを他者に伝えることができるよう改善を図った。

◆ GDC トップマネージメントへの改訂版トレーニングプログラムの提言及び GDC の人材育成方 針の再確認

トレーニング終了時に、GDC 経営層との意見交換を通じて、GDC が教育プログラムで継続 的に利用することができるようなトレーニング教材をまとめた。

◆ トレーニングプログラムの人材開発プログラムへの統合

トレーニング終了時には、上記の提言や方針の再確認を経て、その時点に GDC が実行もし くは改定しようとしている人材開発プログラムへ、改訂された本プロジェクトによるトレー ニングプログラムを統合し、その後 GDC の人材育成に反映された。

1.6 その他の活動と特記事項

他の援助機関の動向

ケニア国における地熱開発やその促進のための支援は、他の複数のドナーによっても実施も しくは計画されている。そのため、それらの動向について業務期間中も情報収集に努め、必要 に応じて適宜 JICA との情報共有や相談を行った。

ナイロビに常駐する個別専門家との連携

本プロジェクトに関連し、JICA が別途に 2013 年 9 月からナイロビに派遣している個別専門 家とは、現地作業時だけでなく国内作業時にも電子メールなどによる綿密な連絡・情報共有 を行い、他ドナーや GDC の動向などを考慮した活動やその調整に努めた。

ケニア国地熱開発マスタープラン調査

「ケニア国の全国地熱開発マスタープラン策定に係る支援プロジェクト」(ケニア・マスタ ープラン)は、本プロジェクトのOJTと並行して実施された。この結果両プロジェクトにおけ る相互関係に伴い、ケニア・マスタープランで得られた成果は非常に高く、またGDCとも深 い信頼関係を築くことができた。

プロジェクトの評価調査への協力

本プロジェクトの期間中に実施が予定されている中間レビューや終了時評価においては、その基礎資料となる Project Design Matrix (PDM) や Plan of Operation (PO)の修正や、2018年4月に JCC が開催され、その議事録(M/M)の取りまとめに協力した。

プロジェクトの広報活動

本プロジェクトの意義・活動内容・成果について両国の国民や他ドナーなどに広く理解して もらうために、JICAの広報活動に協力するだけでなく、各種施策につき積極的に提案及び活 動を実施した。本活動において制作された映像は、本プロジェクトにおける活動の広報向け ビデオ (TICAD IV 用に制作)、地熱掘削技術の講義ビデオ (GDC の講義ビデオとして全48巻 制作)、GDC の広報ビデオ、そしてその他の学会・国際会議などでの講演発表や雑誌類への写 真並びに記録動画が作成された。

1.7 トレーニング活動の概要

トレーニング活動は、添付資料 2 の PDM で定義されている成果 2~7 に従って概要説明されている。別の観点から、トレーニングプログラムの一部が日本で実施されたことは価値のあることと言える。

プロジェクト活動の詳細は上記の1.5及び1.6に記載されているが、JICAによって供与された先進的な機器、ソフトウェア、機材、及びサービスの使用についても言及するに価する。 供与機材のリストは添付資料13に示されている。機器及びサービスは、地球科学、掘削、環境モニタリング、プラントエンジニアリングなどのモジュールにおけるトレーニングプログラムの大部分に貢献した。供与機材を含むトレーニングは、その使用に限定されただけでなく、これらの資産の維持管理、運用及び整備(O&M)にも拡張された。

トレーニング活動の概要を表1-1に示す。活動は、対応する成果、分野、専門家名、専門家 によって行われた工数(日数)と渡航回数の総数に応じて分類される。

成果	· 分野 地質		トレーニング対象者 GRA 地熱資源技術者	JICA 専門家名 副田, 義山	各専門家の 累積工数/ 渡航回数 112 日/6 回
	地質	ハザードマッピング (土木工学)	地熱資源技術者 /エンジニ ア及び関連部門	大石	21 日/1 回
		MT 探査	GRA 地熱資源技術者	本田	65 日/4 回
2	物理探查	重力探査	GRA 地熱資源技術者	齋藤	40 日/3 回
		MEQ 探查	GRA 地熱資源技術者	Onacha	44 日/2 回
		地化学	GRA 地熱資源技術者	松田,内山	105 日/7 回
	地化学	室内化学分析, 試料採取	GRA ラボラトリー技術者	井野	105 日/4 回
	掘削	掘削現場 OJT	掘削要員 (例:エンジニア,	池田,和田, 佐々木(純),小松, 清野,高橋,篠崎, 南,菊池,豊田, 阿部(剛)、池野元	
3		クラスルームセッシ ョン	技術者,機械工, 電気技師な ど)	藤貫, 中野, 阿部(智), Cruz, Suasin, Del Valle, Arrieta II, Baena, Genis, Astorga, Canete,	1148 日/ 49 回
		隔週会議	隔週会議	掘削エンジニア, 掘削マネ ージャー	Augusto, Mission, Dela Cruz, Jereza, Barile, Cabrillas
	資材調達支援	ž	調達部門担当者	石垣	82 日/5 回
	データベース		GRA 地熱資源技術者	福岡	60 日/3 回
	貯留層モデリング		GRM 地熱資源技術者	福岡, リマ	97 日/6 回
4	掘削地点選定		GRM 地熱資源技術者	赤迫, リマ	99 日/7 回
-	検層		検層技術者, エンジニア	畠中	57 日/3 回
	坑井試験		坑井試験エンジニア,技術 者	塩塚	20 日/1 回
5	経済性評価		幹部,経理,エンジニア (CPS),財務,他関連部門	金子	51 日/4 回
	公社経営		幹部,経理,エンジニア (CPS),財務,他関連部門	広瀬, 大和田	90 日/6 回
	蒸気供給契約	」締結促進	幹部,経理,エンジニア (CPS),財務,他 関連部門	田嶋	45 日/4 回
	環境社会配	社会配慮	エンジニア/技術者(環境部),	吉村, 寺本	76 日/5 回

表 1-1 第一期トレーニング活動の概要(2014年2月~2015年11月)

	慮	(EMS, RAP)	社会関係部門		
		環境モニタリング	エンジニア/技術者(環境部)	伊利	8 日/1 回
	プラントエン	·ジニアリング	エンジニア/技術者(GRM, SHE)他 関連部門	山本,肥後,松尾	134 日/8 回
6	地熱多目的利用		エンジニア/技術者(直接利 用部門) 他 関連部門	重富	123 日/5 回

表 1-2 第一期本邦研修の概要(2014年2月~2015年11月)

成果	分野	トレーニング内容	トレーニング対象者	研修	研修
				首数	日数
		第1回		6名	31 日
		掘削技術トレーニングコース			
		第2回		6 名	31 日
2	十日 米山	掘削技術トレーニングコース	掘削要員 (エンジニア, シフトリ ーダー, 機械技師, 電気技師)		
3	加出月1	第3回		6名	31 日
	掘門 第4	掘削技術トレーニングコース			
		第4回		6名	31 日
		掘削技術トレーニングコース			
		第1回,第2回		5 名	19 日
4	时间屋河江	貯留層評価トレーニングコース	CDML业劫次源计任书		
	灯笛眉評価	第3回	UKM 地然寅你抆附石	4 名	39 日
		貯留層評価トレーニングコース			

表 1-3 第二期トレーニング活動の概要(2016年4月~2019年12月)

成果		分野	トレーニング対象者	JICA 専門家名	各専門家の 累積工数/ 渡航回数
	地質	地質	GRA 地熱資源技術者	副田, 義山, 藤井	41 日/9 回
		MT 探査	GRA 地熱資源技術者	本田	79 日/7 回
	物理探查	重力探查	GRA 地熱資源技術者	齋藤	56 日/5 回
2		MEQ 探查	GRA 地熱資源技術者	Onacha	42 目/4 回
		地化学	GRA 地熱資源技術者	松田, 内山	102 日/9 回
	地化学	室内化学分析, 試料採取	GRA ラボラトリー技術者	井野	77 日/5 回
		掘削現場 OJT	掘削要員 (例:エンジニア,技	池田, 和田, 佐々木(星), 小松,	
	掘削	クラスルームセッ ション	術者,機械技師, 電気技師な ど)	岩谷,小林, 阿部(剛),中野, Cruz, Suasin, Day,	1349 日/46 回
		隔週会議	掘削エンジニア, 掘削マネー ジャー	Baena, Genis, Canete, Dela Cruz, Barile	
3		HSE	掘削要員 (例:エンジニア,技 術者,機械技師, 電気技師な ど)	Abanilla	34 日/1 回
		泥水掘削	掘削要員 (例:エンジニア,技 術者,機械技師, 電気技師な ど)	石川	43 日/3 回
		傾斜掘削	傾斜掘削エンジニア, 傾斜掘 削技術者	Castillo	28 日/3 回
		プラズマカッター OJT	掘削/インフラ業務従事者(例: エンジニア,技術者)	Icabales	9 日/1 回
	資材調達支援		調達部門担当者	石垣	24 日/3 回
4	データベース		GRA 地熱資源技術者	髙園	56 日/4 回
т	貯留層モデリ:	ング	GRM 地熱資源技術者	畠中, リマ	94 日/10 回

	掘削地点選定		GRM 地熱資源技術者	赤迫, 義山, リマ	116 日/9 回
	検層		検層技術者, エンジニア	畠中	18 日/2 回
	坑井試験		坑井試験エンジニア,技術者	畠中	17 日/2 回
	経済性評価		幹部, 経理, エンジニア(CPS), 財務, 他 関連部門	金子	29 日/2 回
	公社経営		幹部, 経理, エンジニア(CPS), 財務, 他 関連部門	広瀬	24 日/3 回
	プロジェク トマネジメ ント	プロジェクトマネ ジメント	幹部, 経理, エンジニア(CPS), 財務, 他 関連部門	段野	16 日/2 回
5		プロジェクトファ イナンス	幹部, 経理, エンジニア(CPS), 財務, 他 関連部門	チヴァース	8 日/1 回
		内部統制	GDC 各部門本部長	デカストロ	8 日/1 回
	環境社会配	社会配慮	エンジニア/技術者(環境部), 社会関係部門	寺本	53 日/4 回
	思	環境モニタリング	エンジニア/技術者(環境部)	伊利	54 日/4 回
	プラントエンジニアリング		エンジニア/技術者(GRM, SHE)他 関連部門	山本, 林, 松尾, Thomas, Mohamed Saeed	136 日/12 回
6	地熱多目的利	用	エンジニア/技術者(直接利用 部門) 他 関連部門	重富	24 日/3 回

表 1-4 第二期本邦研修の概要(2016年4月~2019年12月)

成果	分野	トレーニング対象者	トレーニング対象者	研修 考数	研修日数
3	掘削	第5回 掘削技術トレーニングコース		6名	31 日
		第6回 掘削技術トレーニングコース	- 掘削要員 (エンジニア、シフトリ	6名	30 日
		第7回 掘削技術トレーニングコース	ーダー,機械技師,電気技師)	6名	33 日
		第8回 掘削技術トレーニングコース		6名	33 日
4	貯留層評価	第二期 第1回 時の層評価		6名	41 日
		戦 田 宿町 四 概念モデルセミナー	GRM 地熱資源技術者	7 名	16 日
		貯留層評価セミナー		6名	46 日

第2章 プロジェクト期間中の PDM の進捗

PDM の改訂は、プロジェクトが開始されてから4年後の2018年4月に1回行われた。次の理由により、改訂が必要であった。

2.1 PDM 原案の遂行により発生した課題

以下の表と図に示されている初期の GDC 事業計画によれば、2015 年までに最初の本格的な 地熱発電所の試運転を計画しており、MenengaiVI と名付けられた試運転まで2 年ごとに運転 していくこととなっていた。この事業計画は、PDM 原案の内容を検討する際に重要であった。 したがって、上位目標として「GDC は電力事業者に蒸気を適切に提供できる」と定義された。 また「定量的な評価指標」は、「電力事業者と GDC の間で署名された蒸気購入契約の数」と して定義された。

しかし、プロジェクト開始後、主に Menengai 地熱地点の資源の制限のために、この計画は 実現不可能であることが判明した。その結果、「上位目標」自体はそのままであったが、「評価指標」と「評価手段」の改訂が必要であると考えられ、GDC の蒸気供給能力に焦点を当て るように変更された。 (添付資料2を参照)



表 2-1 GDC の地熱開発 10 年計画 (2010 年発表)



2.2 定量的な評価指標の改訂

PDM 原案を決定する際、目標、目的、及び成果について定量的に評価指標を決定する際に、 専門家とJICA の間で合意にたどり着くことは困難であった。 GDC 組織とその能力はまだ完 全には理解されていなかったが、この能力開発プロジェクトは複雑な技術的及び商業的な側 面を有するという事実を考慮すると、状況はある程度理解できた。数値的に評価指標を定義 することも非常に困難であった。したがって、定義されるなら PDM 原案の内容は一時的で あると考えられて、プロジェクトが進行するにつれ、GDC 及び JICA が明確な状況を把握し たときに修正されると予想された。 PDM の修正は最終的に 2018 年春に行われた。「上位目 標」、「プロジェクトの目的」、「成果」、及び「活動」は、わずかな修正を除きほぼ変更さ れなかったが、添付資料にあるような指標や手段が変更された。修正された PDM では、評 価指標は数値的に単純でわかりやすい表現で定義された。この PDM は関係者にプロジェク トの成果を定量的かつ簡潔に理解させるのに役立った。

第3章 合同調整委員会 (JCC)の記録

本プロジェクトの下で3回の合同調整委員会(JCC)が開催された。この3回のJCC 概要抜粋を添 付資料3から添付資料5に示す。

3.1 第1回 JCC (中間評価)

第1回 JCC は、中間評価が行われた際に開催された。 JCC では、プロジェクト期間、 Project Design Matrix (PDM) 及び Plan of Operation (PO)の改訂、追加の専門家の派遣が協議され、承認された。

- 1) 開催日:2016年4月27日
- 2) 議題:
 - 1. 中間レビューレポートの承認
 - 2. プロジェクト期間
 - 3. 改訂版 PDM 及び改訂版 PO のドラフト完成
 - 4. 専門家の追加分野による派遣
- 3) 討議内容の抜粋
 - 1. 中間レビューレポートの承認完了
 - 2. プロジェクト期間の延長(2018年3月末まで)
 - 3. PDM 及び PO の改訂の必要性を合意 改訂版 PDM ドラフトの定量的な評価指標には、目標値として定義された数値が必要 であった。活動を通じて行われた取り組みを明確にするために、成果に対してより具 体的な指標を追加するものとした。 改訂版 PDM は、第2回 JCC で承認されるか、2016 年 10 月末までに双方が署名 した議事録を通じて合意される必要があるとされた。
 - 4. プロジェクトの第二期では、JICA チームは GDC 内で内部トレーニングを持続的に 実施する GDC の能力を強化するため、内部トレーナーのトレーニングにさらに集中 することとした。 JICA チームの技術移転の取り組みと GDC のモニタリング方法を マッチさせるために、追加のインプットの必要性も検討された。

双方は、JICA が 1) プロジェクトの活動を十分に監視し、GDC と緊密な討議を行い、2) GDC の内部トレーニング/人材開発システムを改善する目的でプロジェクトへの追加イ ンプットの必要性を検討することを確認した。

3.2 第 2 回 JCC

第2回 JCC は、プロジェクトの期間と活動を含む PDM の作業の進捗状況と改訂案を評価するために開催された。

- 1) 開催日:2018年4月20日
- 2) 議題:
 - 1. 作業進捗の説明
 - 2. さらなる作業計画の提示
 - 3. 改訂版 PDM ドラフトと改訂版 PO ドラフトの提示
 - 4. 討議議事録(R/D)の修正提案
 - 5. プロジェクトの実施を改善するために取るべき課題と必要な行動に関する討議
- 3) 討議内容の抜粋
 - 1. PDM に関するプロジェクトの進捗状況が示された。

期待される成果について、Eng. Ole Nchoe は、GDC の掘削地点選定と掘削の能力が まだ限られているという懸念を表明し、その後、より正確な掘削地点選定と掘削のた めに常駐の専門家を派遣するよう JICA に要請した。また、彼は JICA にカルデラ外 を含むより大規模な Menengai のマスタープランを作成するよう要請した。JICA は、 彼らが要請を検討するためにはさらなる情報が必要であると返答した。

- 2. (a) 今後の作業計画については、2019 年1月上旬から2月上旬に終了評価が予定されて いるとした。
 - (b) プロジェクト期間は、2018 年 8 月末まで 5 ヶ月延長されることが提案されている。この問題に関して、Dr. Eng. Njoroge は GDC にプロジェクト期間の延長に関する要望書を提出するように指示し、Eng.Ole Nchoe はそれに同意した。
- 3. プロジェクト期間、PDM 及び PO に関する改訂は、R/D として承認された(最終修 正日は 2017 年 4 月 26 日)。
- 4. R/Dの修正提案
 - 1. R/D 内の"9. Duration. Article .11 OUTLINE OF THE PROJECT" は次のように修正 される。

9.期間

プロジェクトの期間は71か月で、JICA専門家がケニアに最初に到着してから 2019年8月末までとなる。

- 2. R/D (2017 年 4 月)の PDM 及び PO を修正する。
- 5. (a) ABI (イメージ検層)などの新技術の導入と、プロジェクトの資源評価のための コアリング(コア試料採取)の推奨について説明がなされた。
 - (b) 掘削性能向上のために、泥水掘削と5S(「整理」、「整頓」、「清掃」、「清潔」、 「躾」などの基本タスクからなる職場組織化方法)の導入について説明がなされた。

3.3 第3回 JCC (終了時評価)

第3回 JCC は、最終評価が行われた際に開催された。 JCC では、Dr. Eng. Njoroge、事務次 官、エネルギー省は委員会を開始し、その後、地熱開発におけるケニアの取り組みとプロジ ェクトの全体的な達成に対する JICA の関与について、JICA 本部資源・エネルギーグループ 第2チームの若松英治企画役が発言した。 JCC では、終了時評価作業で提示された将来の作 業に関する見解と推奨事項が討論され、承認された。

- 1) 開催日: 2019年9月20日
- 2) 議題:
 - 1. 開会挨拶
 - 2. GDC 代表者、JICA-GDC 合同評価チーム、西日本技術開発プロジェクトマネージャー によるプロジェクトの成果に関する概要説明
 - 3. 今後の進め方
 - 4. 閉会挨拶
- 3) 討議内容の抜粋
 - 1. 開会挨拶
 - 1. Dr. Eng. Joseph Njoroge、事務次官、エネルギー省が議長として開会の挨拶を述べるとともに、すべての参加者に自己紹介を促した。
 - 2. JICA 本部資源・エネルギーグループ第2 チームの若松英治企画役は、地熱開発全般 への貢献についてスピーチし、プロジェクト全体の成果を発表した。さらに、トレー ニング予算が近年減少していることを事務次官と GDC の管理者に指摘して、予算を 増やすように要求した。
 - 3. 事務次官は、ケニア国がトレーニング予算の問題を取り上げることに留意した。その 後、主任地質学者が議長を務めた。

- 2. 概要説明
 - GDC の Strategy, Research and Innovation 本部長である Dr.George Muia は、直面している課題と将来的なサポートの可能性を共有しながら、プロジェクトの概要と 進捗状況について発表した。
 - 2. JICA-GDC 合同評価チームは、評価の結果と推奨事項を共有した。
 - 3. 当社プロジェクトマネージャーは残りの期間のスケジュールを共有した。(2019年 10月~12月)
- 3. 今後の進め方
 - 1. プロジェクト成功へ向けての今後の進め方について合意された。
 - 2. JCC 報告書には、若松氏 (JICA) と Mr. Ahmed Fankey (GDC)が署名した。
- 4. 閉会挨拶

委員会を終了する前に、若松氏が持続可能性なトレーニングのの重要性について、 Dr.Muia がプロジェクトの達成と今後のトレーニングへの関与についてそれぞれスピ ーチを行った。それと引き換えに、Chrispin 議長はエネルギー省職員の訓練の必要性を 表明し、委員会を終えた。

5. 終了時評価の概要抜粋は、添付資料 5 (第 3 回 JCC、終了時評価) に示す。

第4章 最終評価後の活動

4.1 残りの OJT (内部統制、調達、微小地震探査法 (MEQ 探査))

4.1.1 内部統制

内部統制に係るセミナーを 2019 年 10 月 29 日から 31 日に実施した。セミナー開催に先立 ち、JICA 専門家と GDC の人材開発部門は講義の内容や講師について慎重に検討した。25 名 の GDC マネージャーがセミナーに参加し、マネージャー同士の積極的な意見交換が行われた だけではなく、マネージャーと講師間でも活発な意見交換が実施された。マネージャーとし ての職務遂行に係る一般的なテーマの意見収集や意見交換という、マネージャー達にとって 貴重な機会を提供した。そのため、本セミナーは非常に有益だったと認識している。

本セミナーの GDC 参加者のリストを添付資料 10 の Output 5 related – Internal Control and Risk Management Seminar というタイトルの表に示す。

セミナースケジュールのタイムテーブルを表 4-1 に示す。

表 4-1 内部統制、リスク管理及び企業統治手順に関するトレーニングのスケジュール

日時	8:15 - 10:30	10:30- 11:00	11:00 - 1:00	1:00- 2:00	2:00-4:30	4:30			
10/29	 ・開会のあいさつ ・企業統治及び内部統 制に係る導入 		危機管理、内部統制に係 る戦略調整		危機管理及び制御のための COSOの枠組み				
10/30	効果的な危機管理のた めの組織構造 – 3つの 対処法	休憩	公共部門における統制 失敗と適切な危機管理 戦略のための警告	昼食	2:00-3:00 pm 3:00-5:00 pm 汚職リスクに PPDA 2005万 関する管理 び2006年の2 (国連グロー 共調達規制 バル・コンパク ト)	交流会			
10/31	プロジェクト危機管理		公共部門におけるライ フスタイルと管理不能 の間の関連		企業統治のMwongozoコードと PFM法及び規制	:			

4.1.2 調達 OJT

このトレーニングプログラムのセッションは、最後の OJT が実施された 2019 年 10 月最終 週に完了した。

最後のJCC(最終評価)時に提示された保留中の問題について、この最後のOJTのセッションの間に対処された。提示された問題については下記に示す。

- 1. 機器のメンテナンス費とソフトウェアのライセンス更新費のための現状、不十分な予 算配分
- 2. プロジェクト実施期間中にJICAによって提供された資機材の不適切な保管方法
- 3. この地域でロスタイムが生じたことにより求められた物流管理の大幅な改善 上記に関して、外部リスクや予想外の出来事に対してより適切に運営するために、在

庫、メンテナンス、物流計画を再評価することが求められていた。

1) JICA 供与資材の O&M 計画

JICA によって供与された資材に関して、今後5年間の保守及びライセンス維持費を調査し、 GDC に対して、メンテンナンスのための予算確保のために必要な措置を講じることを要求した(添付資料14、15参照)。計画の準備中に、プロジェクトチームは GDC に資材やソフトウェアのメンテナンス計画やそのために必要な予算確保に真剣に取り組むことを推奨した。

注目をされた資材のうち、GDC の担当者は 18 ヶ月の保守サービス契約のための注文書が、 11 月末にケニアの現地代理店に発行されたことを確認した。これは、ガスクロマトグラフ

(Shimadzu GC-8AT)を追加し、さらに GRA によって管理されている機器を更新するために行った。

2) 掘削資材管理

掘削部門は大量の資機材を管理する役割を担っている。以前、掘削部門が調達部門より引き 受けた在庫管理は、不適切なものであった。このため、トレーニングのなかで、プロジェクト 専門家は掘削業界で導入されている資産管理方法を紹介し、掘削部門に在庫管理と保守を組 み合わせた方法を提案し、指導した。提案内容は次のとおりである。

- ① 各資機材にシリアルナンバーを割り振り、GDC 独自のコードで掘削管をはじめ、全ての資機材に対する在庫リストを作成した。識別コードやシリアルナンバーは機器本体の適切な場所に示すこと。
- ② 個々の装置にシリアルナンバーが割り振られた際、対応する保守記録の作成。資機材 を別のリグに移転する際には、必ずこの保守記録と合わせてに移動すること。

この結果、掘削技術マネージャーによると、掘削リグで使用されたすべての装置(JICA から提供された資機材を含む)の在庫調査を四半期に一度実施する計画であることが分かった。 プロジェクト専門家は、掘削部門の在庫調査の結果を調達部門と共有することを要求した。 掘削部門のマネージャーは、SAP(GDCの公式在庫システム)を用いて資機材の個別管理を 行うとした。

4.1.3 微小地震探查(MEQ 探查)

このトレーニングのセッションは 2019 年 11 月の最終に実施された最後の OJT であった。 ハンドブックは最後の OJT 期間中に作成、完成した。ハンドブックのソフトコピーとハード コピーの両方が利用可能である。

4.2 スチームレポート 2

本プロジェクトで、Menengai 地熱地点の蒸気資源構造の検討が実施された。Menengai カル デラ内部の地熱貯留層の形成は比較的若く、Menengai 地熱貯留層モデルの作成は非常に困難 である。非常に異質で深部に位置する地熱貯留層は、正確なモデルを構築することを困難に した。高度な技術によって取得されたデータを含む Menengai 地熱地点の東部での追加データ 収集は地熱貯留層の理解とモデル構築を助けるために実施された。追加で取得したデータの 納入に時間がかかり、これによりスチームレポートの完成も遅れた。

4.3 ハンドブック、ソフトウェア及び映像教材の完成

最後のドラフト段階であった MEQ 探査のモジュールを含む様々なハンドブックが、本プロ ジェクトの下で作成された。ハンドブックは全部で 38 項目の題材が網羅され、7,000 ページ を超える 41 巻にまとめられている。

座学を中心とした 48 種類の掘削講義を基に、映像教材は作成された。全映像教材を合わせ たデータサイズは約 1TB となった。さらに、約 7~8 分間の GDC の広報ビデオが作成され、 国内外の様々なイベントで GDC の活動を宣伝するために使用される。

本プロジェクトでは、トレーニングのためソフトウェアコードの作成も実施した。その大部 分はデータベース構築のモジュールに関するものである。一方、経済評価のモジュールで使 用される Excel のマクロ作成も実施した。(詳細なリストは添付資料 12 に示す)

4.4 修了証の完成

500 部に近い修了証が発行され、そのうち本邦研修に係る修了証が76部、内部統制を実施 した Horrizon Business Solutions によって発行されたものが25部である。修了証発行に関する GDC 規則を満たさなかった研修の一部については、出席証明書を発行した。

4.5 持続可能なトレーニングプログラムの完成

掘削要員のキャリア開発と結びついた持続可能なトレーニングプログラムである VISON プ ログラムを GDC に提案した。本トレーニングプログラムは、新入社員から約 13~15 年の経 験を積み Driller に昇格した人まで、掘削要員の包括的な研修のために行われる。トレーニン グの基本構造は、Roustabout、Floorman、Motorman、Derrickman や Driller などの各掘削要員の レベルに応じたカリキュラムを作成することであり、カリキュラムを設定するにあたり、各 掘削要員のレベルの機能的な役割を定義することが必要である。次のステップへの昇給に必 要な平均年数及び不可欠な能力に到達するための年数を考慮して、トレーニングプログラム を決定した。

トレーニングは基本的に OJT で構成されている。つまり、トレーナーは原則的にトレーニ ー達である。このような分散型のトレーニング構造のため、トレーニングの品質監視と管理 は非常に重要である。毎月のトレーニングレポート及び年間の業務評価はトレーニングの品 質を監視・管理するのに重要であることは言うまでもなく、類似の年功や職務を有するトレ ーニーが集まる不定期な研修もまた、研修の成果として監視し、トレーニングの品質管理及 び標準化するためのツールとして重要であった。

GDC はキャリアと関連した持続可能なトレーニングについて検討し、暫定版の計画はプロ ポーザルと似たものであった。プロジェクトチームによって作成されたプロポーザルは、掘 削要員の各々のレベルをまとめた能力リストや OJT の報告、監視及び管理の手段を提供し、 GDC の考えを強化した。本トレーニングは人材管理と密接に関連している上、トレーニング 以外の要因も含まれるので、各要因を慎重に検討しながら提案したトレーニングプログラム や構造を実行していく。

このプログラムで実施していくことが、掘削要員にとって最も簡単であると考えている。こ のプログラムが成功すれば、このトレーニング方法は GDC 内の他部門の様々なキャリアパス に適用される(定義1:作業員のレベル、定義2:キャリアパス、定義3:各レベルの能力リ スト、定義4:詳細なトレーニングプログラム及びカリキュラムの作成)。これに関する全体 の報告は添付資料16に示す。





第5章 提言

いくつかの提言と実施したレッスンのリストは、最終評価のための最後の JCC の議事録内に記載しており、重要事項についてはよく取り組んだ。プロジェクトチームは上述の議事録と重複しない範囲で、追加情報を示したい。

< GDC 向け>

(1) ハンドブック

ハンドブック、映像教材やソフトウェアコードは本プロジェクトで作成された最も重要な成 果物である。これらの成果物のほとんどは OJT に基づき作成しており、GDC が現在直面して いる問題・課題あるいは GDC の能力を反映して調整された内容となっている。

この理由のため、GDC の能力が向上するにつれ、ハンドブックの内容も継続的に見直す必要がある。また、定期的なハンドブックの改定が実施されていることを確認するため、ハンドブックを毎年の改定することを義務付けるための企業方針を定めることを推奨する。すべてのハンドブックはソフトコピーでも渡しているため、改定は簡単である。

(2) 資機材・ソフトウェアの適切なメンテンナンスプログラム及び予算配分

4.2.1(1) で説明したように、高度な資機材は、定期的なメンテナンス及び較正なしに実用す ることはできない。地球科学部門、掘削部門、環境部門で用いられる特別なソフトウェア、あ るいはその他のアプリケーションにおいて、新しいバージョンにアップデートし続けなけれ ば、旧式の古いものとなってしまう。上記のような資機材やソフトウェアを使用する各部門 は、予算を含む適切なメンテナンス計画を立てなければならない。また、その計画が適切に実 施されていることも確認する必要もある。

プロジェクトチームは、JICA から提供された資機材のためのメンテナンス計画を作成、提案した。関連する GDC 部門は、このプロポーザルを参考にして、毎年のメンテンナンス計画を計画する必要がある。

(3) 命令系統の改善

24 時間、365 日連続的に操作を行う中で、常に緊急的な決定が求められる掘削部門では、特 に命令系統が明確ではなかった。掘削部門の組織について言えば、現場から始まり、掘削部門 の担当者だけが操作、メンテナンス及び物流の3つのパートに分けられていた。加えて、調 達部門やインフラ部門の担当者は、毎日 O&M や物流に関与させられている。掘削作業に最 も責任があると考えている掘削操作グループの組織図のみを見てみると、シフトリーダーと 掘削技術者の責任、命令や権限レベルは明確に定義されていない。結果として、誰が主導的に 行動し、誰が問題を対処するための各操作あるいは一連の操作の直接的または最終的な責任 を負うのか、誰も理解していないことがしばしば認められた。

エンジニアはしばしば大学から直接来るため、部下の管理や他人との調整の経験が不足して いる傾向がある。資機材やサービスのメンテナンスまたは調達に関して、より多くの責任と 権限が与えれれるべきだと考えている。第一に、掘削地点との距離をもっと縮める必要がある。その結果、雇用計画は、それらの責任を満たすように作られなければならない。

(4) 適切な記録管理と異なる技術グループ間の情報共有

掘削は地球科学の研究にとって、需要な情報源である。さまざまな地表調査から推定したものについて、ある意味では究極の答えを提供してくれるものである。

特に、DDR(掘削日報)は、必要なパラメータを含んでおり、適切な記録の管理を行うことを、 GDCの関連のある人々に繰り返し指導している。日報は、掘削の観点のみならず、貯留層モ デルの構築にも役立つ坑井の状況を理解するために不可欠な情報を提供している。残念なが ら、GDCのルーティンとして定着するには至っていない。

DDR 内の以下のパラメータについて、測定及び記録することを再度推奨する。

a. 埋没量(泥水循環によっても坑井から出すことができなかったザクの量。ドリルパイプが詰まる 原因となり、結果としてフィッシングの作業が発生する場合がある。)

b. 逸水量(貯留層の透水性の有する深度の情報を提供する。セメンチング作業(主要及びセメント プラグ)の設計に役立ち、浅部や深部などの貯留層構造を理解にも役に立つ。)

c. 泥水の循環温度(貯留層のスタティック状態の温度や透水性の地層の存在に関する良い指標となる。)

d. 自然水位(現在の坑井の掘削深度における貯留層圧力に係る情報を提供するものである。)

掘削要員は掘削中の地球科学データを最新情報に更新し、これは掘削計画の決定に反映され る。この場合において、上記の掘削パラメータの記録の欠如は、掘削情報の適切な仕様につい て、十分な理解がないことを意味する。掘削部門と地球科学部門の両方が、どの掘削情報が取 得され、報告されるべきか検討することを非常に推奨している。

IADC によって開発された RIMBASE というソフトウェアは、本プロジェクトの中で供与さ れた。これは掘削パラメータが含まれる形式や、関係者間の掘削データの情報共有及び統合 のためのネットワーク適応性の観点から、適切なプラットフォームを提供するものである。 GDC の掘削部門、地球科学部門及びその他の機能に、情報共有を図りより良い決定を行うた め、このツールを使用することを推奨している。

(5) 資産管理と調達

掘削に係る資機材の資産管理は複雑かつ膨大と認識している。これは中国の製造業者が操作 や保守に係るマニュアルを標準品質で提供しなかったことが主な原因である。例えば、マニ ュアル内に有効な図がなく、部品番号がどこに位置するのか判断することはほとんど不可能 である。これは操作及びメンテナンスの両方の観点から非常に難易度の高い課題となってい る。これは GDC が直面している課題があり、調達の専門家によって推奨しているように、資 産管理には改善の余地がある。調達部門は資産管理における専門知識を蓄積している。その ため、シリアルナンバーの設定方法や、関連資機材の物流やメンテンナンスを目的とした管 理票に係る方針の設定など、資産管理指針に関して、調達部門は掘削部門を支援しなければ ならない。 (6) 物理探査に係る提言(MT 探査、重力探査)

全般的な提言:

- 管理者は GRA、GRM 及び掘削チーム間の構築されたチームワークを改良する必要がある。 JICA の資源チームは、各仕事の機能が独立しており、チームワークに改善の余地が十分にあ るという印象を受けた。
- 2) GRA、GRM 及び掘削チームが他チームの専門分野を体験し、自分の専門分野が地熱開発全体 に重要な貢献をしていることを正しく認識するために、チーム間の交代を行うことを推奨す る。
- GDC のマネージャーや若い地球科学学者及びエンジニア達は、これから地熱貯留層の運用・ 管理に行うことになる。これは、彼らの探査技術のレベルや精度を試験するための究極の経 験となる。

物理探查:

全般的な提言

- GDCの物理探査担当者は、物理探査結果のデータの解釈を実行時には、他の地球科学情報(地質、地化学、坑井情報など)を把握する必要がある。この目的のために、地質担当者、地化学担当者及び坑井試験エンジニアと頻繁に打合せを行うことを推奨する。
- 2) 一握りの GDC の物理探査担当者しか、トレーニング内容を詳細に理解していなかった。 そのため、JICA 専門家はトレーニング内容を十分に理解した参加者が、他の技術者や将 来 GDC に入る物理探査担当者に知識や技術を広めることを望んでいる。したがって、上 述の技術をすでに有している GDC の物理探査担当者が、物理探査技術者や物理探査未経 験者に対して、トレーニングマニュアルを用いて GDC 社内での内部トレーニングを実施 することが求められていることを認識する必要がある。
- 3) 物理探査担当者は、将来 GDC 自身が行う地熱開発のための物理探査に関する最新の技術 や情報について研究する必要があり、地熱構造調査のために技術を向上させていく必要 がある。

個別の提言

- GDCは1台のみしか重力計を所有しておらず、仮にその重力計に異常が認められた場合、 現地での物理探査が中断することになる。そのため、予備として、2台目の重力計の購入 を推奨する。
- ハンディ GPS の代わりに、他の GPS 測定装置を用いて、重力ステーションの位置と標高 を測定することを推奨する。現在使用しているハンディ GPS では地形補正の精度が不十 分である。
- 3) 3次元 MT インバージョンに利用可能な高機能なコンピューター所有を推奨する。また、 高機能なコンピューターは汚れによって、制御不能となるため、丁寧なクリーニングを 行うことも必要である。
地化学:

全般的な推奨事項

- 分析データの品質を向上させるために、地化学者の知識を検査技師と共有する必要がある。
- 2) 地化学の原理を理解し、経験の共有を通じて知識を蓄積するために、定期的に内部セミ ナーを開催する必要がある。
- 試料採取用器具及び室内分析機器とソフトウェアを維持するための予算を計画し、確保 すること。供与に頼らず、GDC 自身で行うべきである。

特定の推奨事項

- 貯留層地化学モデルを構築するために、流体の物理的特性(エンタルピー、測定温度など)も考慮に入れなければならない。
- 未知のサンプル分析によって発生した主な化学反応と副化学反応を事前に把握するために、公開中の地化学に関連する論文とライブラリを研究室の書庫ですべて利用できるようにする必要がある。
- 3) 劣化部品の交換の非稼働期間または保守期間を短縮するため、室内分析機器の定期検査 及びスペアパーツの購入保証を確認すること。
- 4) ケニア化学協会(KCS)、ケニア認定機関(KENAS)またはその他の組織がサポートする 会議やトレーニングへの参加が推奨される。
- 5) 噴出試験におけるサンプリング間隔と監視パラメータの設計は、噴出試験計画と流量条 件に従って再検討されるべきである。

坑井試験担当者:

全般的な提言

- 現地調査チームによって取得されたデータの妥当性について判断し、不自然な点が認められた場合は、再調査を実施させるなどし、取得したデータの質を向上すること。
- 2) GRA や GRM の他の部門と協力し、データの妥当性について確認すること。

特定の推奨事項

- 1) スピンナー試験の実施
- 2) 同時噴出試験の実施
- 3) 統一の坑口圧力での坑井ごとの噴出量及び出力についての報告(運転時の坑口圧力とし て最も可能性があると言われているのは 10bar である。)
- 4) 高品質なデータ取得のため、検層器の校正の実施
- 5) Menengai 地熱地点において、温度や圧力などの物理的な状況が機器の仕様を超える可能 性があるため、機材を保護するための試験計画を立てること

- (7) 環境モニタリングに関する推奨
 - a. 上記4.5の通り、体系的なトレーニング計画が提案されているが、環境モニタリングチーム は独自の内部トレーニング計画を作成した。他のトレーニングプログラムについては、プロ グラムの実施に必要な予算を確保することを勧める。
 - b. MenengaiとBaringoで毎月環境モニタリングを実施すること (H₂S、騒音、水質)。また、グループ内及び関連部門内で結果を討議することも重要である。
 - c. すべてのモニタリング機器は、毎年検査及び保守する必要がある。また、キャリブレーション標準液や補助センサーの購入などのメンテナンス予算を確保する必要がある。記録を作成し、管理ブック内のすべてのモニタリング機器の使用状況を管理すべきである。
- (8) トレーナー・トレーニー間の相互信頼

終了時評価でも同様の問題が指摘されたが、JICA プロジェクトチームと GDC 間のコミュニ ケーションについて、補足コメントとして言及するに価する。特にプロジェクトの初期段階 では、JICA 専門家と GDC 研修生との個々の関係が確立されていないため、JICA チームは GDC 研修生の講義への出席が不十分であるという厄介な状況を何度も経験した。GDC 研修生 は職務を持っていて、トレーニングに対して完全に専念できなかった。プロジェクトが進行 し、両チームがお互いをよりよく理解するにつれて、この状況は収まった。

プロジェクト開始前、GDC 能力の急速な改善が緊急の問題であったため、JICA プロジェク トチームへは本格的かつ迅速な展開が要求された。GDC が現在存在しない可能性があるため、 おそらくそれは正しい決定だったと理解している。ただし、プロジェクトを効率的に展開す るという点では、限られた小規模な範囲から始めた方が良いと考えられる。

<JICA 向け>

(1) 資源チームからの提案

資源チーム全般

- 将来同様のトレーニングプロジェクトが計画されている場合、トレーニング単独をプロジェクトの目的とするのではなく、トレーニングを実際の開発プロジェクトの一部とした方がよい。
- 2) 地熱開発の成功につながる最も重要な要素の1つは、運用と活動の全体的な調整に対するオン・タイム供給(必要なもの必要なときに作り供給する)であるため、JICA はプロジェクト対象国や機関において、地熱プロジェクトの実施における実績があり、高い技能を持つマネージャー陣から主に構成され、地下・地上の探査から運用、保守、調達、管理等プロジェクトの全体的な管理を支援するよう追求する必要がある。

物理探查

 物理探査(MT 探査及び重力探査)のトレーニングの流れに関して、調査の計画からデー タ解析(GDC 物理探査技師及び JICA 専門家チームによるデータ収集、データ補正、デ ータ分析、地球物理学解析結果及び井戸情報の検証を含む)までのトレーニングは、GDC のデータ品質のチェック、データ分析の実行、地熱構造の調査などの能力を向上させる ために強く推奨される。 地化学

機器及びソフトウェアの供与に関連して、スペアパーツ、保守及び年間ライセンス料等の主要な予算を確保するために、部門を対象として確認する必要がある。

貯留層工学

1) 地熱発電で最も困難な段階は、発電所の稼働開始後すなわち実際に貯留層の形成が明らかになった段階である。したがって、JICAのトレーニングプロジェクトは、発電所の稼働後に実施する必要がある。 GDC の場合、GRA 及び GRM に所属する人々は、発電施設の稼働前と稼働後の地球科学と工学の違いを理解するために、貯留層及び蒸気供給施設の運用及び整備 (O&M)の関係者でなければならない。それは地球科学者やエンジニアが、探査が目標であるときに適用される方法の価値と精度を得るときに限る。

(2) JICA 専門家による実践トレーニング

本トレーニングプログラムは、個人レベルと組織レベルの両方で、必要な能力と GDC の能力のギャップを狭めるために作成された。

トレーニングプログラムは、個人レベルと組織レベルの両方で、必要な能力と GDC の能力 のギャップを狭めるために作成された。JICA 専門家がトレーニングのニーズに対処するには、 2 つの方法がある。 1 つは、プロジェクトの大部分で採用したもので、トレーニングプログ ラムは知識と機器の欠陥に応じて、OJT による講義と助言で構成されていた。しかし、この方 法では、特に安全性に関連する問題に関して、専門家が GDC の作業状態の悪い下で働くこと を許可しなければならないという特定のジレンマを経験した。

もう1つの方法は、専門家が自分自身でモデルプロジェクトを実施することである。適切な 方法でプロジェクトを実行する方法に関して、関連する GDC 研修生にトレーニングを行っ た。トレーニングの実施前に設備の確認と改修をするため、費用と準備時間が必要になる場 合がある。一方でこの方法では、JICA 専門家が作業に慣れているため、トレーニングをより 適切に導くことができ、より良い結果が得られる可能性がある。これは、掘削だけでなく、地 球科学の対象にも適用できる。

(3) プロジェクト進行の上での問題点に関する考察

このプロジェクトは、GDC 職員へのさまざまな分野のトレーニングを対象としている。 こ れにより、プロジェクト管理の面でいくつかの困難な状況が発生した。 残念ながら、GDC の 組織能力は弱く、プロジェクトチームが解決できない多くの問題がある。 発生した各課題は 独特であり、個別に対処された。 個々の JICA 専門家に割り当てられる時間は限られており、 プロジェクトマネージャーができることにも制限があった。 もう1つのポイントは、この規 模のすべての対象を処理する手段を独自に持っている企業はないということである。 したが って、適切な専門家の支援を関連企業に依頼する必要があった。プロジェクトがいくつかの 小規模で焦点の合ったチームで実施されていれば、もっと簡略化できたと考えられる。 (4) 物理探査に関する推奨事項 (MT 探査及び重力探査)

調査の計画から始まるデータ解析までのトレーニング計画は、データ取得、データ修正、デ ータ分析、地球物理学的解析結果と井戸情報の検証などの一連の活動を含み、GDC 物理探査 技師が JICA 専門家チームとともに作成することが望ましい。それは GDC のデータ品質のチ ェック、データ分析の実行、地熱構造の調査などの能力を向上させるという目的を果たす。

(5) 地化学に関する推奨事項

機器及びソフトウェアの供与に関連して、スペアパーツ、保守及び年間ライセンス料等の主要な予算を確保するために、部門を対象として確認する必要がある。

(6) JICA 専門家の柔軟な投入・調整

この問題はすでに終了時評価で提起されているが、教訓として述べる。

本プロジェクトは、GDC のニーズの変化や能力開発の進捗状況に応じて、専門家の派遣を 柔軟に調整した。例えば、プロジェクトの開始時には、日本人だけで構成される掘削専門家の 配備を目的とした。言葉の壁や期間限定の派遣(日本国内の掘削作業が落ち着く冬期のみの派 遣)という課題に直面し、ほどなく日本人と他の外国人専門家の混合チームに変わり、大きな 成果を上げた。

JICA 専門家の追加派遣として、以下の分野が挙げられる。

- ·傾斜掘削専門家
- ・プラズマカッターOJT 専門家
- ·泥水掘削専門家
- · 製造現場専門家

(坑口バルブ: TIX、計装/制御(I&C):横河電機)

・その他外部専門家

(プロジェクトファイナンス: 三井住友銀行、プロジェクトマネジメント: 日本総合研究所) トレーニングモジュールに関して、当初は計画していなかった GDC の要求やニーズに対応 するために、プロジェクト管理が導入された。また、JICA、GDC 双方は、IPP の決定を容易 にするために、スチームレポート1、2 の作成を含むよう R/D に修正を加えた。

この系列では、日本だけではなく他国においても専門的な援助を求めた。この取り決めのお かげで、プロジェクトは効果的な人員投入、トレーニングモジュール投入を可能にした。

(7) GDC のニーズや条件の変化に応じた柔軟なサービス適応

この問題も最終評価ですでに提起されているが、教訓として提起する。

Menengai 地熱地点は、非常に異質で深部に位置する貯留層で構成されているため、その解析 が大きな課題となっている。新たな地熱有望地点が Menengai カルデラの東部(MW-18A)で発 見されたとき、その地域で詳細な調査を行う必要が生じた。研究の一環として、ABIとコアリ ングは、貯留層に関する有用な情報を提供すると考えられた。最終的に、ABIは3 坑井、コ アリングは1 坑井で行い、プロジェクトの柔軟性を示した。 プロジェクトの柔軟性のもう1つの例は、現地コンサルタントの利用である。プロジェクト の開始時には、その必要性を予測せず、利用可能情報もなかった。プロジェクトが進行し、現 地コンサルタントのニーズと可用性について理解が深まったため、JICAはプロジェクトチー ムの要求に応じてプロジェクトの進行に沿って湧いてきたニーズに柔軟に適応し、適切なコ ンサルタントを雇用した。

雇用した現地コンサルタントとして、以下の分野が挙げられる。

- ・環境社会配慮専門家
- ・公共調達講師
- 内部統制講師

- 添付資料 1: Original PDM
- 添付資料 2: Revised PDM
- 添付資料 3: Excerpts of the 1st JCC (Mid-term evaluation)
- 添付資料 4: Excerpts of the 2nd JCC
- 添付資料 5: Excerpts of the 3rd JCC for the Terminal Evaluation
- 添付資料 6: Project Flow chart
- 添付資料 7: Plan of Operation
- 添付資料 8: Project Manning Chart
- 添付資料 9: List of Dispatched Experts
- 添付資料 10: List of Trainings, Training Counterparts and Certificates Issued
- 添付資料 11: List of Trainings in Japan and Their Participants
- 添付資料 12: List of Products (Handbooks, Visual Aid and Software)
- 添付資料 13: List of Donation Equipment
- 添付資料 14: O&M status of Donated Equipment (GRA, GRM and Environment related)
- 添付資料 15: O&M status of Donated Equipment (Drilling related)
- 添付資料 16: Sustainable Training Program Building a Competency Development Program

1 : Original PDM

Project Design Matrix (PDM) ver.2 (19 June, 2013)

Project Name: The Project for Capacity Strengthening for Geothermal Development in Kenya

Narrative Summary	Objectively Verifiable Indicators	Means of Verification	Important Assumptions
Overall Goal GDC will be able to properly provide steam to power generation utilities.	Number of steam purchase contract signed between power generation utilities and GDC	Copy of steam purchase contracts	
Project Purpose To enhance human resources of GDC which contribute to technical risk mitigation in geothermal development	Success rate of steam development Reduction in work period required for steam development	GDC's drilling reports GDC's work reports	• Geothermal resources suitable for power generation exist in planned development areas.
Outputs 1. Training program for GDC staff will be established.	1-1. Development of check lists and assessment sheet for GDC's staff capacity1-2. Development of training materials and programs	1-1. Check lists 1-2. Training materials	• Necessary amount of water for drilling will be mobilized
2. Capacity in developing conceptual models of reservoirs and siting successful drilling targets will be improved.	 2-1. Number of GDC's staff who accomplished the target level in the capacity checklist for necessary skills in conceptual modeling 2-2. Number of GDC's staff who accomplished the target level in the capacity checklist for necessary skills in well siting 	 2-1. Capacity checklist for necessary skills in conceptual modeling. 2-2. Capacity checklist for necessary skills in well siting 	
3. Capacity to strike drilling targets will be improved.	3-1. Number of GDC's staff who accomplished the target level in the capacity checklist for necessary skills in drilling operation	3-1. Capacity checklist for necessary skills in drilling operation	
4. Capacity in interpreting wellbore data, establishing calibrated reservoir models and evaluating geothermal resources will be improved.	 4-1. Number of GDC's staff who accomplished the target level in the capacity checklist for necessary skills in wellbore data analysis 4-2. Number of GDC's staff who accomplished the target level in the capacity checklist for necessary skills in reservoir evaluation 	 4-1. Capacity checklist for necessary skills in wellbore data analysis 4-2. Capacity checklist for necessary skills in reservoir evaluation 	

 5-1. Number of GDC's staff who accomplished the target level in the capacity checklist for necessary knowledge and skills in environmental and social safeguard 5-2. Number of GDC's staffs who accomplished the target level in the 	 5-1. Capacity checklist for necessary knowledge and skills in environmental and social safeguard 5-2. Capacity checklist for necessary knowledge and skills in plant engineering 	
 capacity checklist for necessary knowledge and skills in plant engineering 5-3. Number of GDC's staff who accomplished the target level in the capacity checklist for necessary knowledge and skills in public/private scheme 	5-3. Capacity checklist for necessary knowledge and skills in public/private scheme	
 6-1. Number of GDC's staff who accomplished the target level in the capacity checklist for necessary knowledge in planning and implementation of multi-purpose use of geothermal energy 7.1. Number of function of the state of the state	6-1. Capacity checklist for necessary knowledge in planning and implementation of multi- purpose use of geothermal energy	
7-1. Number of training materials revised by GDC staff7-2. Number of training programs conducted by GDC staff	 7-1. Revised training materials 7-2. Training programs conducted by GDC 	
<u>Inputs</u>		
Japan <i>Experts</i> • Chief Advisor/ Geothermal Development Planning • Well Siting • Geologist • Geochemist • Geophysicist • Data Integration • Reservoir Simulation • Drilling Operation Management	Kenya Counterparts Coordinator Geologists Geochemists Geophysicists Drilling Engineers Well Logging Engineers Production Test Engineers Reservoir Simulation Engineers Economic Evaluation	
	 5-1. Number of GDC's staff who accomplished the target level in the capacity checklist for necessary knowledge and skills in environmental and social safeguard 5-2. Number of GDC's staffs who accomplished the target level in the capacity checklist for necessary knowledge and skills in plant engineering 5-3. Number of GDC's staff who accomplished the target level in the capacity checklist for necessary knowledge and skills in public/private scheme 6-1. Number of GDC's staff who accomplished the target level in the capacity checklist for necessary knowledge in planning and implementation of multi-purpose use of geothermal energy 7-1. Number of training materials revised by GDC staff 7-2. Number of training programs conducted by GDC staff 7-2. Number of training programs conducted by GDC staff 9 Chief Advisor/ Geothermal Development Planning Well Siting 9 Geologist 9 Geologist 9 Data Integration 9 Reservoir Simulation 9 Drilling Operation Management 	 5-1. Number of GDC's staff who accomplished the target level in the capacity checklist for necessary knowledge and skills in environmental and social safeguard 5-2. Number of GDC's staff who accomplished the target level in the capacity checklist for necessary knowledge and skills in public/private scheme 5-1. Capacity checklist for necessary knowledge and skills in plant engineering 5-3. Number of GDC's staff who accomplished the target level in the capacity checklist for necessary knowledge and skills in public/private scheme 6-1. Number of GDC's staff who accomplished the target level in the capacity checklist for necessary knowledge in planning and implementation of multi-purpose use of geothermal energy 7-1. Number of training materials revised by GDC staff Inputs Japan <i>Experts</i> Chief Advisor/ Geothermal Development Planning Well Siting Geologist Geologist Geologist Geologist Geothysicist Data Integration Drilling Operation Management

1-7. Identifying base-line of GDC's staff capacity and	• Drilling Supervisor	Business Administration	
setting targets	• Reservoir Evaluation	• Environmental and Social	
2-1. Training in conceptual modeling	Wellbore Survey	Safeguard	
2-2. Training in well siting	• Discharge Testing	• Power Plant Engineering	
3-1. Training in drilling operation	Economic Evaluation	• Finance	
3-2. Training in procurement and logistics management	Business Administration/ Finance	• Multi-purpose Use of	
for drilling related equipment	 Partnership with Power Utilities 	Geothermal Energy	
3-3. Training in health, safety and environment (HSE)	• Environmental and Social		
3-4. Training in theory of drilling techniques	Safeguard	Machinery/ Equipment	
4-1. Training in wellbore data analysis	• Power Plant Engineering	 Laboratories 	
4-2. Training in reservoir evaluation	•	 Drilling Rigs 	
4-3. Training in theory of reservoir engineering	• Multi-purpose Use of Geothermal	• MT equipment	
4-4. Training in database development and	Energy	 Project office and office 	
management	 Project Coordinator 	equipment.	
5-1. Training in environmental planning & monitoring			
5-2. Training in plant engineering	Machinery/ Equipment		Apart from the above, the
5-3. Training in public/private scheme planning			following issues exist. These
5-4. Training in structuring agreement and negotiating	Training in Japan		issues to be confirmed at JCC and
with IPPs	 Drilling Techniques 		necessary coordination will be
5-5. Workshop with power generating utilities for	• Reservoir Evaluation		made towards solving issues.
exchanging views			• Some of GDC's equipment
6-1. Identifying multi-purpose uses of geothermal			is not compatible with other
energy applicable in Kenyan geothermal prospects			makers' equipment or spare
6-2. Training in planning pilot projects of multi-			parts as they are not
purpose use of geothermal energy			adopting international
6-3. Training in implementing pilot projects of multi-			standards
purpose use of geothermal energy			• GDC lacks some equipment
7-1. Abstracting faults in training materials and			necessary for transferring
programs			appropriate technology
7-2. Improving training materials and programs			In addition, if there is a need for
7-3. Suggesting revised training programs to GDC top-			interacting with the geothermal
management and reconfirming GDC's human			policy or development plan,
aevelopment policy			issues will be dealt with in
/-4. Integrating training programs into GDC's human			collaboration with Geothermal
resource development programs			Development Master Plan Project
			which will be implemented
			concurrently.

2 : Revised PDM

添付資料 2: Revised PDM

Project Design Matrix: PDM2

Project Name: The Project for Capacity Strengthening for Geothermal Development in Kenya Duration of the Project: 6 years and 3 months (September 2013- December 2019) Project Site: Nairobi, Nakuru and Menengai geothermal field Target group: GDC staff Version.2: 20 April, 2018

Narrative Summary	Narrative Summary Objectively Verifiable Indicators		Important Assumptions
Overall Goal GDC will be able to properly provide steam to power generation utilities.	Available steam at surface(MW worth) Actual generation capacity in MW	Copy of steam report Copy of steam purchase contracts Press release	
Project Purpose To enhance human resources of GDC which contributes to technical risk mitigation in geothermal development	Success rate of steam development (Well targeting) (No. of wells discharging successfully improved by at least 10 points (~2014 vs. 2015~)) Success rate of steam development (Well drilling) (No. of wells reaching target depth improved by at least 10 points (~2015 vs. 2018)) Improvement in the speed of drilling rate (Gross ROP improved at least by 15% (2015 vs 2018)) At least 50% Reduction on the foreign drilling experts in the Rig Crew (~2015 vs. 2018)	GDC reports GDC's drilling reports GDC's drilling reports GDC reports	 Geothermal resources suitable for power generation exist in planned development areas. Sufficient budgetary allocation secured to sustain operation
 <u>Outputs</u> Training program for GDC staff will be established. Capacity in developing conceptual models of reservoirs and siting successful drilling targets will be improved. Capacity to strike drilling targets will be improved. 	 1-1. Development of checklists and assessment sheet for GDC's staff capacity 1-2. Development of training materials and programs 2-1. Target level in the capacity checklist for necessary knowledge and skills realized in constructing geoscience elements to integrated conceptual models 2-2. Target level in the capacity checklist for necessary knowledge and skills realized in the capacity to site wells 2-3. Conceptual model developed / improved by GDC staff based on this training knowledge 3-1. Number of GDC's training staff who accomplished the target level (At least 80% of GDC's trainees completed training and received certificate) 3-2. Downtime reduction due to the equipment failure (At least 15% or more reduction on Wait on Repair time over the total drilling time (2015 vs 2018)) 3-3. Number of accident 	 1-1. Checklists 1-2. Training materials 2-1. Evaluation table for each of the geoscience 2-2. Evaluation table for each of the geoscience 2-3. GDC reports 3-1. Training Reports 3-2 GDC drilling report 	• Necessary amount of water for drilling will be mobilized

		(At least 15% reduction on the number of major accident per total drilling		
		operating time(2015 vs. 2018))		
		3-4. Implementation of logistics management	3-4 GDC drilling report	
		(At least 15% reduction on the total waiting time related to logistics (2015 vs		
		2018))		
		3-5. Timely delivery of drilling materials (At least 15% reduction on the total	3-5 GDC drilling report	
		waiting time related to equipment delivery (2015 vs 2018))		
4.	Capacity in interpreting wellbore	4-1. Target level in the capacity checklist for necessary knowledge and skills	4-1 Evaluation table	
	data, establishing calibrated	realized in the capacity to analyze wellbore data		
	reservoir models and evaluating	4-2. Target level in the capacity checklist for necessary knowledge and skills	4-2. Evaluation table	
	geothermal resources will be	realized in the capacity for reservoir evaluation		
	improved.	4-3. Reservoir evaluation report consulted by the Project	4-3. Steam report	
		4-4. Carried out reservoir assessment and update reservoir model	4-4. Steam report	
_		4-5. Developed Numerical model for Menengai field	4-5. Steam Report + GDC report	
5.	Capacity to prepare economically	5-1. Target level in the capacity checklist for necessary knowledge and skills	5-1. Evaluation table	
	and environmentally viable	realized in the environmental and social safeguard		
	business plans as a steam provider	5-2 Environmental and social safeguard handbooks are developed	5-2 Evaluation table	
	will be enhanced.	5-3. Target level in the capacity checklist for necessary knowledge and skills	5-3. Evaluation table	
		realized in the plant engineering	5.4 Evaluation table	
		5-4. Target level in the capacity checkinst for necessary knowledge and skills	5-4. Evaluation table	
		5.5 Target level in the generative sheaklist for necessary knowledge and skills	5.5 Evaluation tablet	
		realized in the Economic Analysis	5-5. Evaluation tablet	
		5-6 Target level in the capacity checklist for necessary knowledge and skills	5-6 Evaluation table	
		realized in the Public Corporate Business Administration/ Finance		
6.	Capacity in implementing projects	6-1. Target level in the capacity checklist for necessary knowledge and skills	6-1. Evaluation table	
0.	of multi-purpose use of geothermal	realized in the planning and implementation of multi-purpose use of geothermal		
	energy will be enhanced.	energy		
	8,	6-2. Produced a business plan for multi-purpose use of geothermal energy	6-2. Evaluation table + GDC report	
		I I I I I I I I I I I I I I I I I I I		
7.	GDC's internal mechanism to	7-1. Number of training sessions/programs conducted by GDC staff	7-1. JICA report	
	improve and continue training	(At least one session per each module)		
	program will be established.	7-2. GDC's internal trainer's development program is established	7-2. JICA report / GDC report	
	r o	7-3. Number of training materials revised by GDC staff	7-3. JICA report	
		(At least one program per each module)	-	
		7-4. Established guideline for the training certificate in GDC	7-4. GDC HR	
		7-5. Established system to link and reflect training development to the career	7-5. GDC HR	
		development program.		

	Inputs		
Activities	Japan	Kenya	
1-1. Assessment of GDC's human	Experts	Counterparts	
resource development plan and staff	Chief Advisor/ Geothermal Development Planning	Coordinator	
capacity	• Well Siting	 Geologists 	
1-2. Abstracting challenges GDC has	• Geologist	Geochemists	
and compiling measures to improve	• Geochemist	 Geophysicists 	
1-3. Suggesting to GDC top-management	• Geophysicist	 Drilling Engineers 	
and determining the direction of	Data Integration	 Well Logging Engineers 	
training program	• Reservoir Simulation	 Production Test Engineers 	
1-4. Planning training programs	Drilling Operation Management	• Reservoir Simulation	
1-5. Developing training materials	Drilling Supervisor	Engineers	
1-6. Developing checklist and	Reservoir Evaluation	Economic Evaluation	
assessment sheet of GDC's staff	• Wellbore Survey	 Business Administration 	
capacity in necessary skills required	• Discharge Testing	• Environmental and Social	Apart from above,
for geothermal development	Economic Evaluation	Safeguard	following issues exist.
1-7. Identifying base-line of GDC's staff	 Business Administration/ Finance 	 Power Plant Engineering 	These issues to be
capacity and setting targets	• Partnership with Power Utilities	• Finance	confirmed at JCC and
2-1. Training in conceptual modeling	Environmental and Social Safeguard	 Multi-purpose Use of 	necessary coordination
2-2. Training in well siting	• Power Plant Engineering	Geothermal Energy	will be made towards
3-1. Training in drilling operation	 Multi-purpose Use of Geothermal Energy 		solving issues.
3-2. Training in procurement and	Project Coordinator	Machinery/ Equipment	• Some of GDC's
logistics management for drilling	 Geothermal Development Promotion Advisor 	 Laboratories 	equipment are not
related equipment	Project Management	 Drilling Rigs 	compatible with
3-3. Training in health, safety and	Geothermal Training System Enhancement	• MT equipment	other makers'
environment (HSE)		 Project office and office 	equipment or spare
3-4. Training in theory of drilling	Machinery/ Equipment	equipment.	parts as they are
techniques			not adopting
4-1. Training in wellbore data analysis	Training in Japan		international
4-2. Training in reservoir evaluation	Drilling Techniques		standards
4-3. Training in theory of reservoir	• Reservoir Evaluation		• GDC lacks some
engineering	Conceptual Modeling		equipment
4-4. Training in database development			necessary for
and management			transferring
5-1. Training in environmental planning			appropriate
& monitoring			technology
5-2. Training in plant engineering			In addition, if there is a
5-3. Training in public/private scheme			need for interacting
planning			with geothermal policy
5-4. Training in structuring agreement			or development plan,
and negotiating with IPPs			issues will be dealt in

5-5. Workshop with power generating		collaboration with
utilities for exchanging views		Geothermal
6-1. Identifying multi-purpose uses of		Development Master
geothermal energy applicable in		Plan Project which will
Kenyan geothermal prospects		be implemented
6-2. Training in planning pilot projects of		concurrently.
multi-purpose use of geothermal		
energy		
6-3. Training in implementing pilot		
projects of multi-purpose use of		
geothermal energy		
7-1. Identifying deficiencies in training		
materials and programs		
7-2. Improving training materials and		
programs		
7-3. Suggesting revised training		
programs to GDC top-management		
and reconfirming GDC's human		
development policy		
7-4. Integrating training programs into		
GDC's human resource development		
programs		

3 : Excerpts of the 1^{st} JCC (Mid-term evaluation)

	-			
JCC	Date	Attendants	Agenda	Discussion excerpts
description				
Mid-term evaluation	27/04, 2016	<japanese team=""> Mr. Hiroyuki KOBAYASHI (Team Leader) Deputy Director General, and Group Director for Energy and Mining Industrial Development and Public Policy Department, JICA Dr. Katsuya KUGE (Deputy Team-Leader) Acting Director for Energy and Mining Industrial Development and Public Policy Department, JICA Ms. Chiyoko MIYATA (Cooperation Planning) Special Advisor, JICA Mr. Takayuki KURITA (Evaluation Analysis) Senior Consultant, ICONS Inc. <kenya team=""> Mr. Joseph Kitilit (Oversight role) Deputy Manager, Corporate Planning & Strategy (CPS), GDC Ms. Lucy Mukiri (Leader, Kenyan side) Chief Officer, PS, GDC Ms. Beatrice Kipchumba (Evaluation member) Officer III, CPS, GDC Mr. Happana Galgallo (Evaluation member) Planning Officer (Statistician), CPS, GDC</kenya></japanese>	 Recognition of the mid-term review report Project period Finalization of draft revised Project Design Matrix(PDM) and revised Plan of Operation (PO) Possibility of dispatching additional area of experts 	 Approved the mid-term review report Project period was extended to the end of March 2018. Need for PDM and PO revision was agreed. The Objectively Verifiable Indicators in the draft revised PDM need to have numbers defined as target value. More tangible indicators shall be added for the Outputs to clarify the efforts made through the training programs The revised PDM should be endorsed in the 2^{md} JCC or agreed on through Minutes of Meetings signed by both sides by the end of October 2016 In the 2nd phase of the Project, the JICA team will concentrate more on the training of trainers to enhance GDC's capacity to sustainably conduct internal trainings within GDC. It might be necessary to provide additional inputs to harmonize the JICA team's technical training efforts and GDC's existing monitoring system. Both sides confirmed that JICA shall 1) monitor the Project 's activities well and hold close discussions with GDC, and 2) consider the necessity of additional inputs for the Project with the objective of improving GDC's internal training /human resource Development system.

添付資料 3: Excerpts of the 1st JCC (Mid-term evaluation)

4 : Excerpts of the 2^{nd} JCC

添付資料 4: Excerpts of the 2nd JCC

2 nd JCC	20/04, 2018	Ministry of Energy 1. Explanation of the Dr. Eng. Joseph K.Njoroge, Work Progress CBS Principal Secretary Descretary		The project achivementa were presented, some of which are shown here. Staff Trained					
		Mr. Crispin O. Lupe		#	Areas of Training	No of Staff Trained	Department	% Trained	
		Chief Geologist, Geothermal and Geotechnical		1	Geosciences and Reservoir Engineering	76	GRA (85) GRM (39)	60%	
		Mr. Richard Mavisi Lanona Senior Principal Superintendent		2	Drilling	155	Drilling Operations (237)	65%	
		Geologist, Geothermal		3	Environment and Social Consideration	44	Environment (24) Community Relations (25)	90%	
		Company (GDC)		4	Plant Engineering	28	GRM, Projects, QA and Safety	Cross - cutting	
		Eng. Johnson P .Ole Nchoe Managing Director and CEO		5	Direct Use	11	DU (11)	100%	
		(Project Director) Dr. George Muia General Manager, Strategy,		6	Business Development	144	CPS, ARC, DU, DPL, Finance, PMT, Legal, CPM, Supply Chain, QA&S	Cross - cutting	
		Research and Innovation (Project Manager) Mr. Cornel Ofwona		7	Project Management & Finance	17	PMT, CPS, Infra, DO, GRM, Legal	Cross - cutting	
		General Manager, Geothermal Resource Development Ms. Rosemary Njenga Officer, Corporate Planning and Strategy Dept./ (Project focal for JICA)			Drilling Succ	ROP Progres	ision in Menengal Drilling Operatio	n Gross ROP (n Net ROP (m)	m/day)
		JICA Expert team Dr. Naotsugu Ikeda Chief Advisor for the Project Mr. Enrique Lima Lobato Deputy Chief Advisor for the Project Eng. Laban Kariuki Coordinator for West-JEC team Ms. Chiyoko Miyata Geothermal training system enhancement expert			AS APP/U 35 25 15 RIG-1 and RIG-2 started	room 200 Personal International Participants	10 Comp And Address of a second	RIG-6 RIG-6 RIG-7 adds	2017
		JICA Head Office Mr. Eiji Wakamatsu			20-000 10-0000 10-0	NW-09 NW-12 NW-12 NW-15 NW-15 NW-15	ALLINN AL	ALTONIA MINESC	ACC-MMM REC-MMM
		Deputy Director, Energy and Mining group					Drilling Success		

Mr. Takayoshi Miyazaki Special Advisor, Energy and Mining group JICA Kenya Office Ms. Kana Tamura Representative in charge of energy sector Mr. Evanson Njenga In-house consultant for energy sector	2. Presentation of further Work Plan	(a) As for expected outputs, E ng.OleN choe expressed his concerns that GDC's capacity for targeting and drilling respectively. Also, h e requested JICA to cireate a masterplan for greater Menengai that includes outside of the caldera. JICA responded that they would need further information in order for them to consider the request.
		

 Presentation of drat revised PDM and dra revised PO 	t The revision regarding the project period, PDM and PO was approved for the Record of Discussions (last amended on April 26, 2017).
4. Proposal to amend the Record of Discussions	 "9.Duuration. Article .11 OUTLINE OF THE PROJECT" of the R/D shall be amended as follows: 9.Duration The Proiect duration will be 71 (Seventy) months, u ntilth e end of Auqust 2019 commencing after the first arrival of JICA Exoerts in Kenva. The PDM and PO of the R/D (April 2017) shall be amended as attached
5. Discussion on challenges and necessary actions to b taken for improvement of the project implementation	 (a)Recommendation of introducing new technology such as ABI (Acoustic Borehole Imager) and coring for the resource evaluation in the project was explained. (b) For the drilling performance improvement, introduction of mud drilling and 5S (a workplace organization method consisting of basic tasks such as "Sort", "Set In order", "Shine", "Standardize" and "Sustain") was explained

5 : Excerpts of the 3^{rd} JCC for the Terminal Evaluation

添付資料 5: Excerpts of the 3rd JCC for the Terminal Evaluation

Terminal 26/09, Ministry of Energy JCC agenda.	
Evaluation 2019 Dr. Eng. Joseph K. Njoroge, Introductions & Dr. Eng. Joseph Njoroge, PS, MOE as the chairperson well	welcomed all members to the meeting and
CBS, Principal Secretary Opening remarks let the members introduce themselves.	
Mr. Eiji Wakamatsu, Senior Deputy Director, Team 2, Ene	Energy and Mining Group, JICA HQ made
Chief Geologist speech about their contribution to the geothermal developm	pment in general and presented the overall
project achievement. He further requested PS and GDC mat	management to increase training budget by
Geothermal Development	S.
• PS noted that his office would take up the matter on the tran Company(GDC)	training budget. The chairman then handed
Dr. George Muia	
General Manager, Strategy, Presentations Dr. George Muie, General Manager, SPL GDC presented	ted on Project Outline and Progress while
Research and Innovation Research and	ies for future support
(Project Manager)	a findings of the avaluation and the
Mr. Stephen Busieney	e midnigs of the evaluation and the
General Manager, Finance • The WEST-IEC Project leader shared the schedule for the	the remaining period (October- December
Mr. Ahmed Fankey 2019)	the remaining period (Setober December
Deputy Manager, Corporate Planning and Strategy Dept	
(GDC Evaluation team leader) Way forward • It was noted that the way forward was agreed on.	
• The joint evaluation report was signed by Mr. Eiji Waka	akamatsu (JICA) and Mr. Ahmed Fankey
Officer, Corporate Planning and (GDC).	
Strategy Dept.	
(Project focal for JICA/ GDC Evolution team member) GL in the Before closing the session, Mr. Wakamatsu made a speech	ech on the importance of sustainability of
Evaluation team member) Closing remarks the training effort and Dr, Muia made speech on the achieve	evement of the project and his commitment
Officer Corporate Planning and to the future training. In return, Mr.Chrispin, Chair expre	pressed the training need for the ministry
Strategy Dept. personnel, he closed the session.	
(GDC Evaluation team member) 1 Excernts of the Joint	
Ms. Martha Ngugi	
Officer, Human Resource Report The Terminal Evaluation was conducted in accordance with the lates	itest JICA Guidelines for Project
Development Dept. Evaluations issued in May 2014. Current project status and outcomes	nes were assessed from the aspects of the
Evaluation Evaluation The Loint Terminal Evaluation Terminal Evalu	stainability.
Methodology IICA Expert toom	in terviews and questionnaires to the
Dr. Nasteway lists of the list	IICA experts involved in the Project to
Dr. Naolsugu Ikeda Chief Advisor for the Project	sterr experts involved in the riojeet to
Eng Laban Kariuki	
Coordinator for West-IEC team	
Ms Chivoko Miyata	Desition and Organization
Name Inte	Position and Organization
Geothermal training system Mambara of the Joint Dr. Toru Kobayakawa Leader of the evaluation Industri	or director, Energy and Mining Group,
enhancement expert	artment Japan International
Terminal Evaluation Coopera	peration Agency (IICA)
JICA Head Office	or Deputy Director Team 2 Energy
Mr. Eiji Wakamatsu and Mir	Mining Group, Industrial Development

	Senior Deputy Director, Team 2,				and Public Policy Department, JICA
	Energy and Mining group		Mr. Kazuki Seki	Cooperation Planning	Staff, Team 2, Energy and Mining Group,
	Mr. Jun Totsukawa				Industrial Development and Public Policy
	Evaluation Consultant -IICA				Department, JICA
	contracted		Mr. Jun Totsukawa	Evaluation Analysis	Director, SANO Planning Co., Ltd
	(JICA Evaluation team member)				
			Kenyan Side		
	JICA Kenya Office		Name	Title	Position and Organization
	Mr. Satoshi Sugimoto		Mr. Ahmed Fankey	Leader of the evaluation	Corporate Planning and Strategy, GDC
	Senior Representative			team	
	Mr. Yukio Takahashi		Ms. Phyllis Runviri	Deputy leader of the	Human Resource Development, GDC
				evaluation team	r i i i i i i i i i i i i i i i i i i i
	Representative in charge of energy		Ms. Rosemary Nienga	Member	Corporate Planning and Strategy, GDC
	sector		Ms. Diana Waringa	Member	Corporate Planning and Strategy, GDC
			Ms Martha Nougi	Member	Human Resource Development GDC
			1015: 10101 the 1 (Bugi	internition	Human Resource Development, ODC
		Schodula of the Joint	The Terminal Evaluation	was conducted during the i	period between the 11th of September and
		Terminal Evaluation	the 26th of September 2	019	
	A abiquamenta of the Droiget	Terminar Evaluation	the Zoth of September, 2	017	
	Achievements of the Project	The fellessing and the a	-himments of immed has t	he times of the Territed Free	heating has been languaged at the and Warnen
	Records of inputs	The following are the a	chievements of inputs by t	the time of the Terminal Eva	aluation by both Japanese side and Kenyan
		side.			
	Lange City	1) A			
	Japanese Side	1) Assignment of Expe	rts		
		Since the beginning of	the Project, a total of 107 e	experts were dispatched as o	of the Terminal Evaluation on a short-term
		basis. The details are sh	nown in Annex 6.		
		2) Training in Japan			
		Seventy one (71) perso	ns in total participated in the	he training course in Japan.	The details are shown in Annex 8.
		3) Provision of Equipm	ient		
		Major equipment provi	ded includes, mud additive	es, various measurement equ	ipment, software, and a project car. The
		details are shown in An	inex 10.		
		4) Operational Cost			
		Japanese side has cover	red approximately 77,820 t	thousand JPY in total as loc	al expenses.
	Kenyan Side	1) Kenvan Counterpart	s		
		Kenvan side assigned t	- he Project Director response	sible for the overall adminis	tration and implementation of the Project
		and the Project Manage	er as well as the Project co	ordinator	and implementation of the Project,
		2) Operational cost	as well as the Hojeet CO	orumator.	
		Kenvan side allocated t	he following necessary co	sts approximately 67 645 th	ousand Kenya Shilling for the Project
		Kenyan side anocated t	the ronowing necessary cos	sis, approximatery 07,043 th	iousanu Kenya Simmig 101 me F10ject.
	Results of the Activities and	Achievement status of	the each Output is as follow	ws:	
	Achievement of the Outputs	Output 1. Training	program for GDC staff w	vill be established	
1	rienevenient of the outputs	Output 1. Iranning	nogram for ODC stall w	m or cotabilisiicu.	

Indicators	Activities and Achievement Level
1-1. Development of	Indicator 1-1 was achieved.
checklists and	The Project conducted a baseline survey on capacity of GDC staff and produced
assessment sheet for	checklists and assessment sheets that show the skills gaps comparing the baseline status
GDC's staff capacity	and requirement level for their tasks.
	The Project has been monitoring how much the targeted GDC staff have upgraded their
	technical skills by using the checklist.
1-2. Development of	Indicator 1-2 was achieved.
training	Training materials and programs were prepared for each technical field based on the
materials and program	ns capacity gap analysis in 2014. The Project set the goal of training in two phases as
	follows:
	1) In the first two years of the Project, JICA experts conduct trainings of GDC staff on
	technical topics necessary for geothermal development; and
	2) In the latter phase of the Project, GDC internal trainers take primary roles as trainers
	to train its staff on the technical topics.
	After the development of training textbooks, they have been reviewed from time to time
	and modified in parallel with training progresses.
Overall Assessment:	
The Project has achie	ved Output 1.
Based on the thoroug	h baseline survey of the GDC staff's technical knowledge and skills, the Project team
elaborated existing tra	aining programs and materials or developed new ones where it didn't already exist for each
technical field. The p	rograms and materials were continuously upgraded during the project period.
Output 2: Capacity	in developing conceptual models of reservoirs and siting of successful drilling targets will
be improved.	
Indicators	Activities and Achievement Level
2-1. Target level in th	e Indicator 2-1 was almost fulfilled.
capacity checklist for	Since the start of the project, the Project team has carefully monitored its progress of
necessary knowledge	and GDC staff's capacity development. In this Output 2 category, the team assessed the
skills is realized in	baseline, target line and present status of fundamental skills to construct reservoir
constructing geoscien	ce conceptual models in the areas of geology, geochemistry, and geophysics.
elements to integrated	As Table 1 below shows, the present total score of assessment result is 180 against target
conceptual models.	score, 187, reaching 96% of the target. The reason for this slightly lower score is that
	part of trainings had not yet been finished. For example, scores on geophysics are
	relatively lower than the others because training on Micro-Earthquake were delayed
	compared to the original schedule.
2-2. Target level in th	e Indicator 2-2 was almost fulfilled.
capacity checklist for	As in indicator 2-1, the Project has carefully monitored its progress of capacity
necessary knowledge	and development activities since the Project started.
skills realized in the	As it is shown in Table 2, the total score of assessment result is 178 against target score,

capacity to site wells.185, reaching 96% of the target Inc., Reasons of current status and expectation on geophysics are the same as in indicator 2-1.* Most of the necessary knowledge and skills to develop conceptual models and to site wells are identical. Therefore, the number of target technical items and accordingly target scores are almost the same.2-3. Conceptual model developed / improved by GDC staff based on this training knowledge.Indicator 2-3 was fulfilled. Geothermal Resource Assessment group of GDC improved the conceptual model of disposition of per tooks is now visible; and 3) estimation of geological structure is much more accurate due to introduction of Acousti Borehole Image data.Overall Assessment: The Project has almost achieved Output 2 as the last training program on micro-earthquake observation has been completed in November. As achievenent status of the respective indicators shows, the majority of technical items that are indispensable to develop conceptual models and to site wells reached the target level. Application of ABI well logging and familiarity with high specification software, the training for which was supplemented in the middle of the project, enhanced the technical capacity of GDC to develop conceptual models and to site wells.Table 1, Achievement status of capacity development regarding reservoir conceptual model (Indicator 2-1)FieldNumber of topicsTechnical titems scorePresent Achievement \$Geochemistry3183636Geology6255758100Geochemistry318363699Geology6255758100Geochemistry31							
geophysics are the same as in indicator 2-1. * Most of the necessary knowledge and skills to develop conceptual models and to site wells are identical. Therefore, the number of target technical items and accordingly target scores are almost the same. 2-3. Conceptual model developed / improved by GDC staff based on this training knowledge. Indicator 2-3 was fulfilled. Geothermal Resource Assessment group of GDC improved the conceptual model of Menengai through a series of data analysis on geology, geochemistry and geophysics. Major improvements on the model can be identified as follows: 1) location and dispersion of heat sources are shown on the basis of information analysis on geology an geophysical exploration results; 2) distribution of cap rocks is now visible; and 3) estimation of geological structure is much more accurate due to introduction of Acoustie Borehole Image data. Overall Assessment: The Project has almost achieved Output 2 as the last training program on micro-earthquake observation has been completed in November. As achievement status of the respective indicators shows, the majority of technical items that are indispensable to develop conceptual models and to site wells reached the target level. Application of ABI well logging and familiarity with high specification software, the training for which was supplemented in the middle of the project, enhanced the technical capacity of GDC to develop conceptual models and to site wells. Table 1, Achievement status of capacity development regarding reservoir conceptual model (Indicator 2-1) Field Number of Technical Target Present Achieveremet % on score Geology 6 <t< td=""><td>capacity to site wells. 185</td><td>, reaching 96% of the</td><td>e target line. Re</td><td>easons of curr</td><td>ent status and ex</td><td>xpectation on</td></t<>	capacity to site wells. 185	, reaching 96% of the	e target line. Re	easons of curr	ent status and ex	xpectation on	
* Most of the necessary knowledge and skills to develop conceptual models and to site wells are identical. Therefore, the number of target technical items and accordingly target scores are almost the same. 2-3. Conceptual model developed / improved by GDC staff based on this training knowledge. Indicator 2-3 was fulfilled. Geothermal Resource Assessment group of GDC improved the conceptual model of Menengai through a series of data analysis on geology, geochemistry and geophysics. Major improvements on the model can be identified as follows: 1) location and dispersion of heat sources are shown on the basis of information analysis on geology and geophysical exploration results; 2) distribution of cap rocks is now visible; and 3) estimation of geological structure is much more accurate due to introduction of Acoustie Borehole Image data. Overall Assessment: The Project has almost achieved Output 2 as the last training program on micro-earthquake observation has been completed in November. As achievement status of the respective indicators shows, the majority of technical items that are indispensable to develop conceptual models and to site wells. Table 1, Achievement status of capacity development regarding reservoir conceptual model (Indicator 2-1) Field Number of Technical Target Present Achievement 9, topics 13 (18 (19 (19 (19 (19 (19 (19 (19 (19 (19 (19	geo	physics are the same	as in indicator	2-1.			
wells are identical. Interctore, the number of target technical items and accordingly target scores are almost the same.2-3. Conceptual model developed / improved by GDC staff based on this training knowledge.Indicator 2-3 was fulfilled. Geothermal Resource Assessment group of GDC improved the conceptual model of Menengai through a series of data analysis on geology, geochemistry and geophysics. Major improvements on the model can be identified as follows: 1) location and dispersion of heat sources are shown on the basis of information analysis on geology an geophysical exploration results; 2) distribution of cap rocks is now visible; and 3) estimation of geological structure is much more accurate due to introduction of Acoustis Borehole Image data.Overall Assessment: The Project has almost achieved Output 2 as the last training program on micro-earthquake observation has been completed in November. As achievement status of the respective indicators shows, the majority of technical items that are indispensable to develop conceptual models and to site wells reached the target level. Application of ABI well logging and familiarity with high specification software, the training for which was supplemented in the middle of the project, enhanced the technical capacity of GDC to develop conceptual models and to site wells.Table 1, Achievement status of capacity development regarding reservoir conceptual model (Indicator 2-1)FieldNumber of Geology6255758100Geochemistry318318363183644889Conceptual model and siting1104039 <td>* N</td> <td>lost of the necessary</td> <td>knowledge and</td> <td>skills to dev</td> <td>elop conceptual</td> <td>models and to site</td>	* N	lost of the necessary	knowledge and	skills to dev	elop conceptual	models and to site	
2-3. Conceptual model Indicator 2-3 was ultifiled. 2-3. Conceptual model Indicator 2-3 was ultifiled. developed / improved by GDC staff based on this Indicator 2-3 was ultifiled. Geothermal Resource Assessment group of GDC improved the conceptual model of Menengai through a series of data analysis on geology, geochemistry and geophysics. Major improvements on the model can be identified as follows: 1) location and location and wajor improvements on the model can be identified as follows: 1) location and geophysical exploration results; 2) distribution of cap rocks is now visible; and 3) estimation of geological structure is much more accurate due to introduction of Acoustie Borehole Image data. Overall Assessment: The Project has almost achieved Output 2 as the last training program on micro-earthquake observation has been completed in November. As achievement status of the respective indicators shows, the majority of technical items that are indispensable to develop conceptual models and to site wells reached the target level. Application of ABI well logging and familiarity with high specification software, the training for which was supplemented in the middle of the project, enhanced the technical capacity development regarding reservoir conceptual model (Indicator 2-1) Field Number of Technical Target Present Achievement % Geology 6 25 57	wel	Is are identical. There	efore, the numb	er of target to	echnical items a	nd accordingly	
2-3. Conceptual model developed / improved by GDC staff based on this training knowledge.Indicator 2-3 Was full inter- dispersion of the model can be identified as follows: 1) location and dispersion of heat sources are shown on the basis of information analysis on geology an geophysical exploration results; 2) distribution of cap rocks is now visible; and 3) estimation of geological structure is much more accurate due to introduction of Acousti Borchole Image data.Overall Assessment: The Project has almost achieved Output 2 as the last training program on micro-earthquake observation has been completed in November. As achievement status of the respective indicators shows, the majority of technical items that are indispensable to develop conceptual models and to site wells reached the target level. Application of ABI well logging and familiarity with high specification software, the training for which was supplemented in the middle of the project, enhanced the technical capacity development regarding reservoir conceptual model (Indicator 2-1)FieldNumber of topicsTechnical topicsTarget presentAchievement % decologyGeotopyGeotopyGeothemistry318361000Geothemistry318318318318181818 </td <td></td> <td>get scores are almost t</td> <td>ine same.</td> <td></td> <td></td> <td></td>		get scores are almost t	ine same.				
Geodenerminal Resource Assessment group of ODE one enhance on the torule plant induct of of DC staff based on this training knowledge.Geodenerminal Resource Assessment group of ODE one peology, geochemistry and geophysics. Major improvements on the model can be identified as follows: 1) location and dispersion of heat sources are shown on the basis of information analysis on geology an geophysical exploration results; 2) distribution of cap rocks is now visible; and 3) estimation of geological structure is much more accurate due to introduction of Acousti Borehole Image data.Overall Assessment: The Project has almost achieved Output 2 as the last training program on micro-earthquake observation has been completed in November. As achievement status of the respective indicators shows, the majority of technical items that are indispensable to develop conceptual models and to site wells reached the target level. Application of ABI well logging and familiarity with high specification software, the training for which was supplemented in the middle of the project, enhanced the technical capacity of GDC to develop conceptual model (Indicator 2-1)FieldNumber of topicsTechnical TargetTarget PresentAchievement % on score geologyGeology6255758100Geochemistry318363699Geophysics318544889Conceptual model and siting110403996wells110403996	2-3. Conceptual model Ind developed / improved by Ga	thermal Pasourca A	a.	n of GDC im	proved the cone	optual modal of	
ConstructionInterfaction unlogend a structure is on the model can be identified as follows: 1) location and dispersion of heat sources are shown on the basis of information analysis on geology an geophysical exploration results; 2) distribution of cap rocks is now visible; and 3) estimation of geological structure is much more accurate due to introduction of Acoustic 	GDC staff based on this	nengai through a serie	es of data analy	y of ODC III	y geochemistry	and geophysics	
adding into wreeger Inspir may on heat sources are shown on the basis of information analysis on geology an geophysical exploration results; 2) distribution of cap rocks is now visible; and 3) estimation of geological structure is much more accurate due to introduction of Acoustic Borehole Image data. Overall Assessment: The Project has almost achieved Output 2 as the last training program on micro-earthquake observation has been completed in November. As achievement status of the respective indicators shows, the majority of technical items that are indispensable to develop conceptual models and to site wells reached the target level. Application of ABI well logging and familiarity with high specification software, the training for which was supplemented in the middle of the project, enhanced the technical capacity of GDC to develop conceptual models and to site wells. Table 1, Achievement status of capacity development regarding reservoir conceptual model (Indicator 2-1) Field Number of technical Target Present Achievement 9/ on score on sco	training knowledge Ma	ior improvements on	the model can	be identified	as follows: 1) lo	cation and	
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estimation of geological structure is much more accurate due to introduction of Acoustic Borehole Image data.Overall Assessment:The Project has almost achieved Output 2 as the last training program on micro-earthquake observation has been completed in November. As achievement status of the respective indicators shows, the majority of technical items that are indispensable to develop conceptual models and to site wells reached the target level. Application of ABI well logging and familiarity with high specification software, the training for which was supplemented in the middle of the project, enhanced the technical capacity of GDC to develop conceptual models and to site wells.Table 1, Achievement status of capacity development regarding reservoir conceptual model (Indicator 2-1)FieldNumber of topicsTechnical topicsTarget topicsPresent scoreAchievement % topicsGeology6255758100Geochemistry318544889Conceptual model and siting topics110FieldNumber of topicsTechnical topicsTarget ScorePresent ScoreAchievement % Score <td colspan<="" td=""><td>geo</td><td>physical exploration</td><td>results; 2) distr</td><td>ibution of ca</td><td>o rocks is now v</td><td>isible; and 3)</td></td>	<td>geo</td> <td>physical exploration</td> <td>results; 2) distr</td> <td>ibution of ca</td> <td>o rocks is now v</td> <td>isible; and 3)</td>	geo	physical exploration	results; 2) distr	ibution of ca	o rocks is now v	isible; and 3)
Borehole Image data.Overall Assessment:The Project has almost achieved Output 2 as the last training program on micro-earthquake observation has been completed in November. As achievement status of the respective indicators shows, the majority of technical items that are indispensable to develop conceptual models and to site wells reached the target level. Application of ABI well logging and familiarity with high specification software, the training for which was supplemented in the middle of the project, enhanced the technical capacity of GDC to develop conceptual models and to site wells.Table 1, Achievement status of capacity development regarding reservoir conceptual model (Indicator 2-1)FieldNumber of topicsTechnical itemsTarget ScorePresent Achievement % topicsGeology62557581000Geochemistry3183631857581000Geochemistry318544889Conceptual model and siting110Geology62557<	esti	mation of geological	structure is mu	ch more accu	irate due to intro	duction of Acoustic	
Overall Assessment: The Project has almost achieved Output 2 as the last training program on micro-earthquake observation has been completed in November. As achievement status of the respective indicators shows, the majority of technical items that are indispensable to develop conceptual models and to site wells reached the target level. Application of ABI well logging and familiarity with high specification software, the training for which was supplemented in the middle of the project, enhanced the technical capacity of GDC to develop conceptual models and to site wells. Table 1, Achievement status of capacity development regarding reservoir conceptual model (Indicator 2-1) Field Number of topics Technical Target present Achievement % Geology 6 25 Geochemistry 3 18 36 36 99 Geophysics 3 18 54 48 89 Conceptual model and siting 1 10 40 39 96	Bo	ehole Image data.					
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To the project, enhanced the technical capacity of GDC to develop conceptual models and to site wells.Table 1, Achievement status of capacity development regarding reservoir conceptual model (Indicator 2-1)FieldNumber of topicsTechnical itemsTarget scorePresent scoreAchievement % on scoreGeology6255758100Geochemistry318363699Geophysics318544889Conceptual model and siting110403996wells-7118718096	well logging and familiarity with	h high specification s	software, the tra	uning for wh	ich was supplem	iented in the middle	
Table 1, Achievement status of capacity development regarding reservoir conceptual model (Indicator 2-1)FieldNumber of topicsTechnical itemsTarget scorePresent scoreAchievement % on scoreGeology6255758100Geochemistry318363699Geophysics318544889Conceptual model and siting110403996wells-7118718096	of the project, enhanced the tech	inical capacity of GD	C to develop c	onceptual mo	dels and to site	wells.	
Geology 6 25 57 58 100 Geochemistry 3 18 36 36 99 Geophysics 3 18 54 48 89 Conceptual model and siting wells 1 10 40 39 96 Total/average - 71 187 180 96	Field	Number of	Technical	Target	Present	Achievement %	
Geology 0 2.5 57 58 100 Geochemistry 3 18 36 36 99 Geophysics 3 18 54 48 89 Conceptual model and siting wells 1 10 40 39 96 Total/average - 71 187 180 96	Geology	6	25	57	58	100	
Geophysics 3 16 50	Geochemistry	3	18	36	36	99	
Conceptual model and siting wells110344060Total/average-7118718096	Geophysics	3	18	54	48	89	
Conceptual model and simility110403790wells-7118718096	Concentual model and siti	<u>σ</u>	10	40	30	96	
Total/average - 71 187 180 96	Conceptual model and sin		10	40	57	/	
	wells					,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	
	wells Total/average		71	187	180	96	
	wells Total/average	-	71	187	180	96	
Table 2, Achievement status of capacity development regarding siting wells (Indicator 2-2)	wells Total/average Table 2, Achievement status of	- capacity developmen	71 t regarding siti	187 ng wells (Ind	180 icator 2-2)	96	
Table 2, Achievement status of capacity development regarding siting wells (Indicator 2-2) Field Number of Technical Target Present Achievement 9	wells Total/average Table 2, Achievement status of Field	- capacity developmen Number of	71 t regarding siti Technical	187 ng wells (Ind	180 icator 2-2) Present	96 Achievement %	
Table 2, Achievement status of capacity development regarding siting wells (Indicator 2-2) Field Number of topics Technical items Target score Present on score	wells Total/average Table 2, Achievement status of Field	capacity developmen Number of topics	71 t regarding siti Technical items	187 ng wells (Ind Target score	180 icator 2-2) Present score	96 Achievement % on score	
Table 2, Achievement status of capacity development regarding siting wells (Indicator 2-2)FieldNumber of topicsTechnical itemsTarget scorePresent on scoreAchievement 9 on scoreGeology6255758100	wells Total/average Table 2, Achievement status of Field Geology	- capacity developmen Number of topics 6	71 t regarding siti Technical items 25	187 ng wells (Ind Target score 57	180 icator 2-2) Present score 58	96 96 Achievement % on score 100	

Geophysics	3		18	54	48	8 89		
Conceptual model	1		10	40	39	96		
and siting wells								
Total/average	-		71	185	17	8 96		
Output 3: Capacity	to strike drilling ta	rgets will	be improved	1.				
Indicators	Activities and A	chieveme	nt Level					
3-1. Number of GDC	's Indicator 3-1 wa	s fulfilled	1.					
training staff wh	no Training record	of Output	3 is as follow	s. More	than 80% of	of the staff accomplished		
accomplished the	he the target level.	Certificat	es will be off	ered to t	them by the	e end of the Project. Ou		
target	of 247 accumul	ative staff	members wh	no attend	ded the dri	lling classroom session		
level (At least 80% o	f held in 2016 and	2018, 17	2 managed th	e minim	um require	ed attendance (7 session		
GDC's traine	es or more). And 8	8% (161	staff member	s) comp	oleted the s	sessions (test score 50%		
completed training	or more). 48 st	aff memb	ers participat	ted in tr	ainings in	Japan, and all of then		
and receive	ed completed the tr	ainings. I	Eight (8) staf	f membe	ers receive	d trainings on operation		
certificates)	and maintenanc	e of a plas	sma cutter an	d 100%	completed	d the training. Therefore		
	a total of 228	a total of 228 drilling staff members completed drilling OJT and classroom						
	sessions.	-		-		-		
	Table 2 Trai			~				
	Table 5, Trai	ning recc		g				
						Rate of trainees		
			Number	of	Farget rate	receiving certificate		
			trainees sati	sfying	of	(certificate holders /		
	Trainings	Year	the minin	the minimum attendance given	certificate	trainees		
			attendance requiremen		satisfied minimum			
				ent	8	attendance)		
						86%		
	Drilling OJT	2016	76		80%	(65 trainees)		
	classroom							
	session	2018	96		80%	100%		
	— · · · ·	_				(96 trainees)		
	I rainings in		40		0004	100%		
	Japan	-	48		80%	(48 trainees)		
	(on drilling)					1000/		
	Operation and	-	8		80%	100%		
	maintenance o	t	Ĭ		/0	(8 trainees)		

						-
	plasma cutter		220	000/	0.40/	-
	Total		228	80%	94%	
3-2.Downtime	Indicator 3-2 is no	t fulfille	d.			
reduction due to the	The percentage of	f days w	aiting for repair	against total	l drilling days adverse	ely
equipment failure	increased from 20	15 to 20	 Primary reason 	n is that drill	ling works at MW19B	in
(At least 15% or more	2018 requested to	purchase	rotary table beari	ngs after the	ir failures, but it requir	ed
reduction on Wait on	almost 60 days u	intil the	ir arrival from o	verseas. Th	is event influenced t	he
Repair time over the	indicators' percent	age. If a	spare part procu	rement plan	had existed and/or be	en
total drilling time	improved with con	sideration	on of possible repa	airs that refle	ect the current equipme	ent
(2015 vs. 2018))	condition and their	r origina	l lifetime, this kine	d of loss tim	e might have reduced.	
	Table 4, Loss time	e due to	equipment brea	kdown and	wait for repair	
			Wells co	ompleted	Wells completed	
			in 2	2015	in 2018	
	Total days of dril	ling	1,40	03.8	513.4	
	Days waiting for	repair	12	3.9	66.4	
	Percentage of day	/s waitin	g for			
	repair against to drilling	otal day	s of 8.9	9%	12.9%	
	Wells completed	in 2015:	12A MW10 MW	120 A MW1	7.4 MW/00P	
	Wells completed	1A, 10100 in 2018	13A, IVI VV 10, IVI VV	50A, 101 W 1	/A, IVI VV 09D	
	MW18B MW 2	111 2016. 7 MW10	$\mathbf{P} \mathbf{MW} 15 \mathbf{A}$			
	IVI VV 10D, IVI VV-2	, IVI VV I ;	D, WW IJA			
3-3. Number of	The indicator 3-3	was fulfi	lled.			
accidents	There was only o	one majo	or accident in 201	18, which c	learly shows significa	ınt
(At least 15%	improvement again	nst 11 ac	cidents in 2015. To	otal drilling	operation days per maj	jor
reduction on the	accident improved	by more	e than 400%.			
number of major						
accidents per total drilling operating time	Table 5, Numbe	r of ma	jor accidents per	total drillin	ng operating days	
(2015 vs. 2018))			Wells co	ompleted	Wells completed	
			in 2	015	in 2018	
	Total days of dril	ling	1.40	03.8	513.4	
	Number of major	accider	ts 1	1	1	

		1		
	Drilling or	peration days per	127.7	513.4
	major accid	lent	days/accident	days/accident
	Major acc	dents per drilling		0.0010
	operation d	avs	0.0078	0.0019
	Wells com	leted in 2015		
	MW10A M	$\frac{1}{1000} = \frac{1}{1000} = 1$	AW10 MW30A MW1	7A MWOOR
	Walls some	100-21A, $1010015A$, 10	VI VV 10, IVI VV JOA, IVI VV 1	7A, MW09B
	Wens comp	$\frac{112016}{100}$	X71<i>C</i> A	
	MW18B, N	1W-27, MW19B, MV	W15A	
3-4. Implem	entation of Indicator 3-4	is not fulfilled.		
logistics m	anagement Improvemer	ts in reducing loss	time related to logistic	c management were not
(At leas	t 15% realized bet	veen 2015 and 2018	s. although both of the	m are not so significant
reduction o	f the total (figures such	as 2.9% in 2015 and	13.7% in 2018).	
waiting time	related to One of the r	aior reasons for loss	time was delay in fuel	supply at Menengai due
	2015 vs to belated by	dget disbursement	time was delay in raci	supply at monoligar due
		uget uisoursement.		
		Table 6, Loss time	e due to logistic mana	gement :
		,	U	6
			Wells completed	Wells completed
			in 2015	in 2018
	Total days	of drilling	1 403 8	513.4
		dua ta logistia	1,405.0	515.4
	Loss time	due to logistic	41.3	18.8
	managemen	it (days)		
	Percentage	of waiting days	• • • •	
	due to log	stics management	2.9%	3.7%
	against tota	l days of drilling		
	Wells com	pleted in 2015:		
	MW19A, N	4W-21A, MW13A, N	AW10, MW30A, MW1	7A, MW09B
	Wells com	bleted in 2018:		
	MW18B. N	IW-27, MW19B. MV	W15A	
	,	.,		
3-5. Timely	delivery of Indicator 3-:	was fulfilled.		
drilling ma	terials (At Procurement	and delivery process	ses are more efficient f	han before. Waiting time
least	due to equip	nent delivery against	total drilling days impr	roved significantly (from
15% reduct	ion of the 7.1% in 201	5 to 1.9% in 2018) Th	he timely delivery impr	oved by more than 370%
13% Teduct	1011 01 110 111 201	, to 1.770 m 2010). H	ic amony derivery mipro	5, eq 0 y more man 570%.

total waiting time related to equipment delivery (2015 vs 2018))	Table 7, Loss time	due to equipment d	elivery :
		in 2015	in 2018
	Total days of drilling	1.403.8	513.4
	Loss time due to delay in delivery of materials (days)	100	9.7
	Loss time / total days of drilling	7.1%	1.9%
	MW19A, MW-21A, MW13A, MW Wells completed in 2018: MW18B, MW-27, MW19B, MW1	710, MW30A, MW17 5A	7A, MW09B
The Project has almost a Technical capacity on du show, 1) the number of r are showing significant related to logistics mana Although half of the indi such as speed of drilli improvements, which ar Considering these facts, ² The speed of drilling is a experts in a rig crew: 1-2	achieved Output 3. rilling has been steadily developing the najor accidents per drilling time and 2) improvements. On the other hand, 3) gement could not satisfy the target lev cators were not achieved, it can be add ng rate and occupancy rate of fore e placed as another indicator of the Pr it can be concluded that Output 3 is all as follows: 10.8m/day in 2015, 18.3 m experts/rig crew in 2015, none in 2015	rough a series of trai total waiting time du wait on repair time a rel. ed that other crucial f ign experts in rig c oject purpose. most achieved. /day in 2018; and the 8.	nings. As the indicators te to equipment delivery nd 4) total waiting time factors for drilling works rew ² are also showing
Output 4: Capacity in evaluating geothermal	n interpreting wellbore data, estal resources will be improved.	olishing calibrated	reservoir models and
Indicators	Activities and Achievement Level		
4-1. Target level in the	Indicator 4-1 was almost fulfilled.		. 1.1 1 1
capacity checklist for	In the same manner as other technica	I categories, the Proje	ct assessed the baseline,
and skills realized in	analyze wellbore data.	start regarding nece	ssary icennical nems to

the capacity to analyze wellbore data.	The present total score is 23 as 96% of the target.	gainst the target	score, 24, which	is satisfying
	Table 8,: Achievement status o data	of capacity develo	pment regarding a	analysis of wellbor
	Technical item	Baseline	Target line	Present status
	Planning of wellbore test	4.0	4.0	4.0
	Management of measurement equipment	4.0	4.0	4.0
	Data procurement	4.0	4.0	4.0
	Data integration	3.0	4.0	4.0
	Evaluation of data quality	3.0	4.0	4.0
	Data analysis	3.0	4.0	3.0
and	evaluate reservoir.	of GDC stall reg	arding necessary	technical items t
and skills realized in the capacity for reservoir evaluation	evaluate reservoir.The present total score is 23 a of the target.Achievement status of capacity d	gainst the target evelopment regard	score, 24, which ding reservoir eval	technical items to i is satisfying 969 uation
and skills realized in the capacity for reservoir evaluation	 and present status of evaluate reservoir. The present total score is 23 a of the target. Achievement status of capacity d Technical item 	gainst the target evelopment regard Baseline	score, 24, which ding reservoir eval	is satisfying 969 uation Present status
and skills realized in the capacity for reservoir evaluation	target file and present status ofevaluate reservoir.The present total score is 23 aof the target.Achievement status of capacity dTechnical itemBasic theory	gainst the target evelopment regard Baseline 3.0	score, 24, which ding reservoir eval Target line 4.0	is satisfying 96 uation Present status 4.0
and skills realized in the capacity for reservoir evaluation	target file and present status of evaluate reservoir.The present total score is 23 a of the target.Achievement status of capacity dTechnical itemBasic theoryVolumetricreservoirevaluation	gainst the target evelopment regard Baseline 3.0 3.0	score, 24, which ding reservoir eval Target line 4.0 4.0	is satisfying 96 uation Present status 4.0 4.0
and skills realized in the capacity for reservoir evaluation	all present status of evaluate reservoir.The present total score is 23 a of the target.Achievement status of capacity dTechnical itemBasic theoryVolumetric evaluationManipulation grid	evelopment regard Baseline 3.0 3.0 3.0	score, 24, which ding reservoir eval Target line 4.0 4.0 4.0	uation Present status 4.0 4.0 4.0
and skills realized in the capacity for reservoir evaluation	 a get file and present status of evaluate reservoir. The present total score is 23 a of the target. Achievement status of capacity d Technical item Basic theory Volumetric reservoir evaluation Manipulation of 3D numerical grid Natural state calibration 	gainst the target evelopment regard Baseline 3.0 3.0 3.0 2.0	score, 24, which ding reservoir eval Target line 4.0 4.0 4.0 4.0	is satisfying 96 vation Present status 4.0 4.0 4.0 4.0
and skills realized in the capacity for reservoir evaluation	talget file and present status ofevaluate reservoir.The present total score is 23 aof the target.Achievement status of capacity dTechnical itemBasic theoryVolumetricreservoirevaluationManipulationManipulationof3DnumericalgridNatural state calibrationNatural state calibration	a GDC stall regard gainst the target evelopment regard <u>Baseline</u> <u>3.0</u> <u>3.0</u> <u>3.0</u> <u>3.0</u> <u>2.0</u> <u>2.0</u>	score, 24, which ding reservoir eval Target line 4.0 4.0 4.0 4.0 4.0 4.0	is satisfying 964 uation Present status 4.0 4.0 4.0 4.0 4.0 4.0 4.0
and skills realized in the capacity for reservoir evaluation	talget file and present status ofevaluate reservoir.The present total score is 23 aof the target.Achievement status of capacity dTechnical itemBasic theoryVolumetricreservoirevaluationManipulationManipulationof3DnumericalgridNatural state calibrationNatural state calibrationForecasting simulation	a GDC stan regardered gainst the target evelopment regardered gaseline 3.0 3.0 3.0 3.0 3.0 2.0 2.0 1.0	score, 24, which ding reservoir eval Target line 4.0 4.0 4.0 4.0 4.0 4.0 4.0 4.0 4.0	technical items a is satisfying 96 uation Present status 4.0 4.0 4.0 4.0 4.0 3.0
A 3 Pasaryoir	Taiget file and present status ofevaluate reservoir.The present total score is 23 aof the target.Achievement status of capacity dTechnical itemBasic theoryVolumetricreservoirevaluationManipulation of 3DnumericalgridgridNatural state calibrationNatural state calibrationForecasting simulation	a GDC stall regard gainst the target evelopment regard <u>Baseline</u> <u>3.0</u> <u>3.0</u> <u>3.0</u> <u>3.0</u> <u>2.0</u> <u>2.0</u> <u>1.0</u>	score, 24, which ding reservoir eval Target line 4.0 4.0 4.0 4.0 4.0 4.0 4.0	technical items a is satisfying 96' uation Present status 4.0 4.0 4.0 4.0 4.0 4.0 4.0 4.0 4.0 4.0 4.0 4.0 4.0 4.0 4.0 4.0

consulted by the Project 4-4. Carried out reservoir assessment	Reservoir evaluation report, the Steam Report 1, was elaborated in early 2018 mainly by the JICA expert team, applying the use of existing data collected until around 2017. GDC staff and JICA experts are now preparing the Steam Report 2 using new data of exploration and wellbore. Completion of the report is scheduled by November, 2019. Indicator 4-4 has been progressing and is likely to be fulfilled by the end of the Project.
and update reservoir model	The Project developed the reservoir model of Menengai in the course of the Steam report elaboration. The model is now under updating with application of new data. The new reservoir model changed permeability dispersion and boundary condition. Owing to the change, the new model enables to reproduce temperature and pressure of new wellbores.
4-5. Developed numerical model for	Indicator 4-5 has been progressing and is likely to be fulfilled by the end of the Project.
Menengai field	The numerical model for Menengai field was developed at the time of elaborating the Steam report 1. Since then, under the Project, the model has been updated through development of the Steam report 2. One of the features of the update is to employ dual porosity model, which can reproduce enthalpy of spouting fluid.
Overall Assessment:	d Output 4 as the aphicument level of the Output has been higher as compared with
that at of the Terminal e	valuation.
Capacity in interpreting resources have been stress satisfied to the target lev	wellbore data, establishing calibrated reservoir models and evaluating geothermal ngthened. The result of capacity assessment shows that most of technical items were rel.
The Steam report 2 is model	prepared, which includes updating the reservoir model and reservoir numerical
Output 5: Capacity to pr steam provider will be e	epare economically and environmentally viable business plans as a nhanced
Indicators	Activities and Achievement Level
5-1. Target level in the	Indicator 5-1 is already fulfilled.
necessary knowledge and skills realized in	target line and present status of GDC staff regarding technical items, which are necessary for tasks regarding environmental and social safeguards.
the area of environmental and social safeguards	The present total score is 71 against the target score, 68, which surpassed the target as shown in the Table 3-15.
social saleguarus.	

5-2. Environmental	Indicator 5-2 has been fulfilled as the h	nandbook is d	eveloped and	l endorsed by
and social safeguard	relevant GDC experts.			
handbooks are				
5.3 Target level in the	Indicator 5.3 is already fulfilled			
5-5. Target level in the	Indicator 5-5 is already furthed.	agorias the Dr	niact assassa	the baseline
necessary knowledge	target line and present status of GDC st	aff regarding	technical iter	ns which are
and skills realized in	necessary for plant engineering	an regarding	teenneur ner	iis, which are
the plant engineering	The status of capacity development wa	as assessed at	the time of	each training
	opportunity. The target levels were all cl	eared at each	time.	6
	1) Training on plant engineering (1st trai	ning)		
	The first training focused on fundament	tal technical i	tems to plan	steam supply
	facilities. Target trainees were from entr	y level staff to	o middle clas	s technicians,
	20 in total. As the below Table shows, th	e average sco	re surpassed t	he target.
	Table 9, Capacity assessment on plant engine	eering for the 1	st training (Feb	oruary, 2015)
	Technical items		Rate of	Rate of
		Number of	correct	correct
		number of	answers	answers
		questions	(before	(after
			training)	training)
	Entry level knowledge on plant	13	65%	97%
	engineering	12	4.40/	0.40/
	Geothermal power plant	13	44%	94%
	Steam gathering system (basic)	8	44%	/0%
	selection of locations of well pads and	6	48%	82%
	Selection of type capacity admission			
	pressure of power plant	6	38%	65%
	Technical issues to be considered in		4.407	
	SSA	9	44%	80%
	Total/Average	55	48%	84%
	Target			80%
	2) Training on plant engineering (in cons	struction perio	d)	

The training focused on necess period. These technical items also	sary technic so cleared th	cal items before/du le target level.	uring construction
Table 10, Capacity assessmen	it on plant e	engineering (Febr	uary, 2015)
Technical items	Number of questions	Rate of correct answers (before training)	Rate of correct answers (after training)
Contract management	13	54%	78%
Safety management	13	70%	100%
Process control	8	78%	98%
Approval process of design	6	61%	95%
Operation test and quality test	6	43%	83%
Total/Average	55	60%	91%
			80%
3) Training on plant engineering Training was conducted by in necessary steps on training imp	(2nd trainir ternal traine plementation	ng) ers of GDC in M 1 such as setup of	ay 2018. All the training schedule
3) Training on plant engineering Training was conducted by in necessary steps on training imp elaboration of training materials and implementation of exams w result of the training also passed	(2nd training ternal trained plementation s, coordinat vere done by the target le	ng) ers of GDC in M i such as setup of ion of training ver y two (2) GDC inte evel.	ay 2018. All the training schedule nues, development ernal trainers. The
3) Training on plant engineering Training was conducted by in necessary steps on training imp elaboration of training materials and implementation of exams w result of the training also passed Table 11, Capacity assessment on	(2nd training ternal trained plementation s, coordinat vere done by the target le plant engined	ng) ers of GDC in M i such as setup of ion of training ver y two (2) GDC into evel. ering for the 2nd train	ay 2018. All the training schedule nues, developmen ernal trainers. The ning (May, 2018)
3) Training on plant engineering Training was conducted by in necessary steps on training imp elaboration of training materials and implementation of exams w result of the training also passed Table 11, Capacity assessment on Technical items	(2nd training ternal trained plementation s, coordinat vere done by the target le plant engined	ng) ers of GDC in M i such as setup of ion of training ver y two (2) GDC inte evel. ering for the 2nd train Rate of co (after	ay 2018. All the training schedule nues, development ernal trainers. The ning (May, 2018) prrect answers training)
3) Training on plant engineering Training was conducted by in necessary steps on training imp elaboration of training materials and implementation of exams w result of the training also passed Table 11, Capacity assessment on Technical items Fundamental knowledge of geo	(2nd training ternal trained blementation s, coordinat vere done by the target le plant engined	ng) ers of GDC in M i such as setup of ion of training ver y two (2) GDC into evel. ering for the 2nd train Rate of co (after	ay 2018. All the training schedule nues, development ernal trainers. The ning (May, 2018) prrect answers training) 94%
3) Training on plant engineering Training was conducted by in necessary steps on training imp elaboration of training materials and implementation of exams w result of the training also passed Table 11, Capacity assessment on Technical items Fundamental knowledge of geo General outline of geothermal	(2nd training ternal trained plementation s, coordinat vere done by the target le plant engined <u>othermal</u> plant	ng) ers of GDC in M a such as setup of ion of training ver y two (2) GDC into evel. ering for the 2nd train Rate of co (after	ay 2018. All the training schedule, nues, development ernal trainers. The ning (May, 2018) prrect answers training) 94% 96%
Target3) Training on plant engineering Training was conducted by in necessary steps on training imp elaboration of training materials and implementation of exams w result of the training also passedTable 11, Capacity assessment on Technical itemsFundamental knowledge of geo General outline of geothermal p Conceptual Design of steam ga	c (2nd training ternal trained plementation s, coordinat vere done by the target le plant engined pthermal plant thering syst	ng) ers of GDC in M i such as setup of ion of training ver y two (2) GDC inte evel. ering for the 2nd train Rate of co (after em	ay 2018. All the training schedule, nues, development ernal trainers. The ning (May, 2018) prrect answers training) 94% 96% 68%
3) Training on plant engineering Training was conducted by in necessary steps on training imp elaboration of training materials and implementation of exams w result of the training also passed Table 11, Capacity assessment on Technical items Fundamental knowledge of geo General outline of geothermal Conceptual Design of steam ga Design of electricity facilities	(2nd training ternal trained olementation s, coordinat vere done by the target le plant engined othermal plant thering syst	ng) ers of GDC in M i such as setup of ion of training ver y two (2) GDC inte evel. ering for the 2nd train Rate of co (after em	lay 2018. All the training schedule, nues, development ernal trainers. The ning (May, 2018) orrect answers training) 94% 96% 68% 79%
1arget 3) Training on plant engineering Training was conducted by in necessary steps on training imp elaboration of training materials and implementation of exams w result of the training also passed Table 11, Capacity assessment on Technical items Fundamental knowledge of geo General outline of geothermal provide the strain of steam gad Design of electricity facilities Wellhead generator	(2nd training ternal trained plementation s, coordinat vere done by the target left plant engined plant engined plant plant	ng) ers of GDC in M i such as setup of ion of training ver y two (2) GDC into evel. ering for the 2nd train Rate of co (after em	lay 2018. All the training schedule, nues, development ernal trainers. The ning (May, 2018) prrect answers training) 94% 96% 68% 79% 72%
1arget 3) Training on plant engineering Training was conducted by in necessary steps on training imp elaboration of training materials and implementation of exams w result of the training also passed Table 11, Capacity assessment on Technical items Fundamental knowledge of geo General outline of geothermal proceedings Conceptual Design of steam ga Design of electricity facilities Wellhead generator Average	(2nd training ternal trained plementation s, coordinat vere done by the target le plant engined plant engined pthermal plant thering syst	ng) ers of GDC in M i such as setup of ion of training ver y two (2) GDC inte evel. ering for the 2nd train Rate of co (after em	lay 2018. All the training schedule, nues, development ernal trainers. The ning (May, 2018) prrect answers training) 94% 96% 68% 79% 72% 82%

5-4. Target level in	the Indicator 5-4 is almost fulfilled.
capacity checklist	for In the same manner as other technical categories, the Project assessed the baseline,
necessary knowle	dge target line and present status of GDC staff regarding technical items, which are
and skills realized	in necessary for public/private schemes.
the public/priv	rate The status of capacity development was assessed at the time of each training
scheme.	opportunity. The number of trainees was 13 GDC staff members each time, and
	most of them continued to participate in all of the trainings. Only the technical
	items of financial agreements at the third training session did not reach the target
	level, though the other items were successfully cleared. It should be considered
	that the third training session required a higher level of knowledge compared with
	the previous two sessions.
5-5. Target level in	he Indicator 5-5 was almost fulfilled.
capacity checklist for	In the same manner as other technical categories, the Project assessed the baseline,
necessary knowle	dge target line and present status of GDC staff regarding technical items, which are
and skills realized	in necessary for economic analysis.
the	The status of capacity development was assessed at the time of each training
Economic Analysis	opportunity. The number of trainees was 29 GDC staff for the first training and 21
	for the second one.
	Most of technical items for the basic course cleared the target level while there
	were some difficulties in the advanced course such as VBA and depreciation. The
	reason for the lower score is its requirement level itself, and the fact that some of
	the trainees without participating in the basic course dragged down the average
	score.
	In this technical category, it is specially noted that two (2) staff members
	successfully upgraded their knowledge and skills to the level which can apply at
	actual business field. They turned to be internal trainers in the economic analysis
	field as well.
	Table 12 Basic course on economic analysis
	Table 12, Dasie course on economic analysis
	Technical item Baseline Target line Present stat
	Economic evaluation methodology 21 40 40
	$\begin{array}{ c c c c c c c c c c c c c c c c c c c$
	Accounting 4.2 4.0 4.4 Finance 3.0 4.0 4.6
	$\begin{array}{ c c c c c c c c c c c c c c c c c c c$
	$\begin{array}{ c c c c c c c c c c c c c c c c c c c$
	LXCEI 2.1 4.0 3.9

		Table 13, Advanced course on economic analysis						
		Technic	al item	Bas	eline	Target line	Present status	
		Free cas	sh flow	2.5		4.0	4.8	
		IDC: Int	terest during constr	ruction 0.5		4.0	3.8	
		Depreci	ation	3.0		4.0	3.5	
		Annual	balance	1.4		4.0	3.8	
		VBA (E	xcel): Visual Basic	0.0		4.0	2.5	
5-6. Target lev	vel in the	Indicator	5-6 is fulfilled.					
capacity chec	cklist for	In the same manner as other technical categories, the Project assessed the baseline,						
necessary k	nowledge	target line and present status of GDC staff regarding technical items, which are						
and	-	necessary for public corporate business administration/ finance.						
skills realized	d in the	The status of capacity development was assessed at the time of each training						
Public	Corporate	opportunity between before and after. Trainings were conducted twice						
Business		respectively in public corporate business administration as well as corporate						
Administratio	n/	finance, inviting 14 GDC staff members. The result of assessment shows that all						
Finance		of the tec	hnical items of bot	h training cou	rses clear	ed the target le	evel.	
Overall Asses	sment:							
The Project ha	The Project has achieved Output 5.Although there were some technical items where the average score could not reach the target, as a whole, it can be evaluated that GDC staff successfully enhanced their technical capacity.The goal of this Output is to enhance technical knowledge and skills in order to enable GDC to prepare							
Although ther								
can be evaluated								
The goal of the								
economically	economically and environmentally viable business plans with an eye to SSA and PPA with IPP. In this line,							
the technical	the technical knowledge and skills developed in this Output helped GDC to conduct smooth bidding and							
contract negot	tiation with	IPP for M	lenengai in 2016. S	ome of the co	unterparts	s worked on th	e negotiation as	
the working g	roup. This i	s evaluate	d as one of the evid	lences of capa	city devel	opment regard	ing this Output.	
Table 14, Ach	ievement s	status of c	capacity developm	nent regardir	ig enviro	nmental and	social safeguar	
Field	Num	ber of	Technical items	Target scor	e Pre	esent score	Achievement	
	to	pics					% on score	
Hvdrogen		1	5	20		21.8	109	
sulfide				-				
Noise		1	4	16		16.4	103	
Water quality		1	4	16		16.6	104	
Scoping		1	4	16		16.2	101	
Total/Average		17	68	71	104%			
--	---	------------------------	----------------------	--------------------	---------------------			
			80%	83%	(beyond the			
					target score)			
Output 6: Capacity in it	mplamanti	ing projects of multi	purpose use of g	othermal energy	will be enhanced			
Indicators		Activities and Achie	vement Level	othermal energy	will be elinanced.			
6-1. Target level i	n the I	ndicator 6-1 is almo	st fulfilled.					
capacity checklist	for 7	The status of capac	ty development	was assessed at	the time of each			
necessary knowledge	e and t	raining opportunity	between before a	nd after. Training	gs were conducted			
skills realized in the pl	anning t	wice in planning an	d implementation	of multi-purpose	use of geothermal			
and implementation	n of e	energy.						
multipurpose use	of A	Among all the 13 tec	chnical items, mos	t of the items met	the target level.			
geothermal energy.								
6-2. Produced a busine	ss plan I	ndicator 6-2 is fulfil	lled.					
for multi-purpose u	ise of	Through analysis of	the multi-purpos	e facility in Men	angai and market			
geothermal energy.	S	survey on social nee	as related with geo	thermal resource	s use, the business			
Overall Assessment:	1	nouel for small scal	e wenneau genera	tor was developed	1.			
The Project has achieve	ed Output	6						
Capacity in implementi	Capacity in implementing projects of multi-purpose use of geothermal energy was strengthened.			rthened.				
In the course of development of a business model as well as a series of training sessions, GDC staff			ssions, GDC staff					
accumulated technical knowledge and skills regarding multi-purpose use of geothermal energy such a			al energy such as					
conceptual design, project cost estimation, selection of appropriate geothermal wells for multi-purpose us			multi-purpose use,					
and analysis of added v	alue by in	stallation of multi-p	urpose use facilitie	es.				
Output 7. CDC's interm	al mechan	ism to improve and	continue training	programs will be	established			
Indicators		as and A chievement		programs will be	established.			
7 1 Number of	Activiti Indicate	r 7 1 is already fulf	illed					
training sessions	The fol	lowing Table shows	the number of tr	aining sessions a	nd/or programs by			
/programs conducted	GDC st	aff	the number of the	anning sessions a	id/or programs by			
by GDC staff (At least								
one session per each		D-1-1- 15 No1	6 ()		CDC staff			
module)		lable 15, Number	or training sessio	ns/programs by	GDC staff			
	Outpu	t Technical ite	ms Number	of training N	Number of			

				sessions conducted by GDC staff	training programs conducted by GDC staff
		Output 2	Geology, Geochemistry, Geophysics	19	
		Output 3	Drilling	8 (Classroom session)	
		Output 4	Reservoir evaluation	5	
		Output 5	Environmental monitoring, Environmental and social safeguard, Plant engineering, Economic analysis	28 (Environmental monitoring: 5, Environmental and social safeguard: 1, Plant engineering : 6, Economic analysis: 4)	1 (Plant engineering)
		Output 6	Multi-purpose use	12	1 (Planning of pilot project)
		Note: Train program ref	ing session means a s fers to a long period of	hort period training (1-2 training (mostly about 1	days); and training week).
	7-2. GDC's internal trainer's development program is established	The major co resource (trai methodology	omponent of the inter iner), training materia	nal trainer's developmen ls (handbooks, visual aid	t program is human and the others) and
		The number personnel bef been created In terms of tra Giga Bytes o purpose have	of GDC's internal tra fore the Project to 39 as and updated by the Hu aining materials, nearly of video footage and a been created.	ainers is steadily growin s of now, and the list of the uman Resource Departme y 7,000 pages of handbool few Giga Bytes of softwa	g from less than 10 e trainers has already nt of GDC. ks and a few hundred are code for training
		The handboo correspondin Although a so	ks include Power Poin g training seminars. olid "program" to deve	nt files and the texts which lop GDC's internal traine	h can be used in the rs is not presented in
		(Geoscientist the trainers d own program	Lab technician, Dril eveloped though the p as the other resources	ler, Drilling Engineers, A roject can apply their OJ are available.	Administrators, etc.), T experience to their

		In addition, the model training program for the drillers based on OJT linked to the career development is developed in the project and accepted by GDC
	7_{-3} Number of	Indicator 7-3 has been fulfilled
	training materials	Fighteen (18) types of handbooks are completed. All the handbooks were
	revised by GDC staff	produced by IICA experts and GDC staff through mutual consultation. The
	(At least one program	following handbooks are
	(At least one program	expected: 1) Geochemistry 2) Geology 3) Geophysical exploration 4)Conceptual
	per each module)	modeling and siting of well targets 5) Drilling 6) Maintenance of drilling
		equipment 7) Drilling (Health Safety Environment) 8)Environmental
		monitoring 9) Environmental and social safeguards 10)Databases 11) Well
		testing, 12) Reservoir evaluation, 13) Plant engineering, 14) Public corporation
		and finance. 15) Direct use, 16) Steam supply, 17) Project management, 18)
		Economic analysis.19) Internal Control, 20) Procurement, 21) MEQ
	7-4. Established	Indicator 7-4 has been fulfilled by the end of the Project.
	guidelines for training	By the end of the Project certificates of training are awarded on the basis of criteria
	certificates in	developed by JICA experts and GDC. The criteria can be regarded as a guideline
	GDC.	for training certificates.
	7-5. Established	The Project has mostly achieved indicator 7-5. In fact, the training program which
	system to link and	the Project team proposed has a similar basis as the one GDC H/R has been
	reflect training	contemplating. There is substantial chance that GDC management adopts a good
	development to the	part of the training program. However, career development is a core policy of the
	career development	company and many factors have to be taken into account. No matter how good or
	program.	useful the training program is, it may take time to implement the program and
		integrate it into the current HR policy.
	Overall Assessment:	
	The Project has been p	rogressing towards achievement of Output /; however, progress on some of the
	Training programs at C	yea.
	handbooks and the addit	ion of many more CDC internal trainers are recognized as one of the highlights of
	the Project's outputs	tion of many more ODC internal damers are recognized as one of the highlights of
	On the other hand the	implementation of the system linked between the training program and career
	development program a	s well as internal trainers' development program must be completed by GDC HR
	and the implementing de	enartment together. Although the basic direction or outline of both systems has been
	already shared within th	e Project, it has not reached the "establishment" stage vet.
Achievement of Project		, , , , , , , , , , , , , , , , , , ,
Purpose	Project Purpose: To enl	nance human resources of GDC which contribute to technical risk mitigation in
	geothermal development.	

Indicators	Activities and Achievement Lev	el	
1 Success rate of steam	The Project has already fulfilled	indicator 1	
development (Well	The number of wells successful	illy discharged was 11	of 29 wells drilled
targeting) (No of wells	before the end of 2014 which is	a 38% success ratio. It	t has improved to 10
discharging successfully	of the 22 wells drilled since	2015 which is a $45%$	success ratio The
improved by at least 10	percentage of success ratio impr	oved by 18%	success ratio. The
points (before 2014 vs. after	* 45%/38% - 118%	oved by 1070.	
2015))	15/0/50/0-110/0		
2 Success rate of steam	The Project has almost fulfilled	indicator 2	
development (Well drilling)	The number of wells reaching ta	arget depth before 2015	5 was 31 of 36 wells
(No. of wells reaching target	drilled, which is 86%. This im	proved to 14 of 15 wel	ls drilled from 2016
depth improved by at least	to 2018, which is 93%. The perc	entage of successful rat	e improved by 8%.
10 points (before 2015 vs.	* 93%/86%=108%		r · · · · · · · · · · · · · · · · · · ·
2018))	Looking at only the four (4) wel	ls completed in 2018, al	ll wells reached their
	target depth.		
3. Improvement in the speed	The Project has already fulfilled	indicator 3.	
of drilling rate	The speed of drilling in 2018	was 18.3 meters per d	ay, which is a 69%
(Gross ROP improved at	improvement against the 10.8 m	eters per day in 2015.	
least by 15% (2015 vs.	It is noted that drilling in 2015 w	vas performed and/or as	sisted by
2018))	international drilling experts whi	ile drilling in 2018 was	performed only by
	GDC staff.		
	Table 16, Speed of drilling rat	te	
		Wells completed	Wells completed
		in 2015	in 2018
	Total days of drilling	1,403.8	513.4
	Drilling depth	15,227m	9,382m
	Speed of drilling	10.8m/day	18.3m/day
	Targeted Wells in 2015:		
	MW19A, MW-21A, MW13A,	MW10, MW30A, MW	17A, MW09B
	Targeted Wells in 2018:		
	MW-2/,MW-15A,MW-20B, M	IW-34	
4 4 4 1 4 500 (1 4		· 1· 4	
4. At least 50% reduction	I he Project has already fulfilled	indicator 4.	fuerra estamora (1)-
of foreign drilling	In 2015, one (1) or two (2) for (2)	oreign drilling experts	from overseas (the

	experts in the rig crew (~2015 vs. 2018)	Philippines and Indonesia) were assigned to each working shift for each rig.Directional drilling works were also handled by external professional companies.In clear contrast, in 2018, none of the rig crews have foreign drilling experts.Also, directional drilling works are handled by GDC national staff.		
	Overall Assessment:			
	The Project has achieved the	Project nurnose		
	Conscity development of G	DC was successfully realized not only in drilling and resource evaluation but		
	also in many technical	also in many technical fields such as economic/financial analysis environmental and social		
	aiso in many connical news such as contonno/inflaticial analysis, environmental and social monitoring/sofocuted plant anoincoming and multi-environce of costhermal resources. The Desired			
	monitoring/safeguards, plan	monitoring/sateguards, plant engineering, and multi-purpose use of geothermal resources. The Project		
	covered nearly all the neces	covered nearly all the necessary technical fields for geothermal development. It can be evaluated that the		
	current technical capacity of	f GDC meets the Project purpose, which is "GDC has human resources who		
	contribute to technical risk n	nitigation in geothermal development".		
Achievement Prospect of	•			
Overall Goal	Overall goal: GDC will be a	ble to properly provide steam to power generation utilities.		
	Indicators	Activities and Achievement Level		
	1. Available steam at	Since an exact target figure is not set, it is difficult to forecast the possibility		
	surface	to fulfill the goal; however, steam supply itself is expected to be highly		
	(MW worth)	possible		
		As of the time of the Terminal evaluation, the construction of power plants at		
		Menengai is expected to commence soon GDC plans to supply steam for		
		these plants which is worth a total of 105 MW. The steam test shows 151.6		
		MW supply volume. Steep report 1 has confirmed that steep will be		
	with supply volume. Steam report 1 has commined that steam will be sufficient for the three IDDs during the life of the projects (25 years)			
		sufficient for the three IPPs during the life of the projects (25 years).		
	2. Actual generation	Since an exact target figure is not set, it is difficult to forecast the possibility		
	capacity in MW	to fulfill the goal; however, power generation itself is highly expected.		
	Achievement Prospect:			
	It may be possible to achieve	a the Overall goal within three to five years after the Project completion		
	Not a pluthe contract with D	The overall goal within three to five years after the roject completion.		
	Not only the contract with IPP but also the facility construction is nearly ready to start steam supply business			
	at the time of the Terminal e	valuation.		
Implementation Process				
of the Project				
Communication	Communication among each	technical field improved as the project progressed and became almost sufficient.		
	In the drilling OJT, however,	where initially the JICA drilling experts consisted of only the Japanese experts, the		
	language barrier posed serious	s problem to the training project orientation phase during which they had to acquire		

	the trainee's trust, understand and diagnose the situation and if necessary to adopt appropriate measures in terms of project implementation. This language problem was solved by adding the experts from Themaprime Drilling. Necessary information was shared at the necessary timing within each technical field. Challenges were observed regarding communication between JICA experts and the management strata of GDC in Nairobi. Since most of the work venues were concentrated in Nakuru, as well as the fact that many of the management personnel were busy and frequently out of office/country, difficulties were encountered finding communication opportunities. Crucial information was shared as a result of bridging efforts by the long term expert stationed in Nairobi, though, challenges to keep close communications between the parties has to be pointed out as one of the challenges in the Project.
Monitoring	Monitoring aspect has to be considered from two aspects; (a) monitoring within each technical field and (b) monitoring on the progress of the project from project management viewpoint. Firstly, the monitoring on each technical field has been well conducted among the JICA experts and Kenyan counterparts. As above described in each Output achievement, the Project carefully monitored capacity development status at all the technical fields. Secondly, the monitoring of the Project from project management perspective was rather insufficient. The Project has produced progress reports every year for monitoring purpose, but there were fewer opportunities to confirm the contents of the reports with all the Project related persons. JICA projects normally require hold a Joint Coordination Committee (JCC) at least once a year. However, the Project had done only twice until the Terminal evaluation in spite of the 6 years project period.
	project management. In other words, PDM and PO have not been paid enough attention, which may have turned to be one of the reasons for some activities delayed such as ones in Output 7.
Evaluation by Five Criteria	Each criterion is evaluated using the following five rankings: "high", "relatively high", "moderate", "relatively low" and "low".
Relevance	Relevance of the Project is high. The Project is consistent with the priority of development policies of Kenya, the needs of the key stakeholders/counterparts, and Japan's Official Development Assistance policy
Consistency with the policy of the Kenyan Government	The Kenyan mid-long term national development policy, Vision 2030, sets the goal for Kenya to become a middle- income country by 2030. The policy emphasizes the importance to develop electric power resources which can enhance industrial competitiveness through reduction of energy cost and stable energy supply. In this regard, geothermal development is placed as one of the prioritized energy sources. The National Energy Policy in 2014 shows the detailed development goal of geothermal power generation by 2030, which aims at increasing the capacity to 5,500 MW from 200 MW in 2011. The policy stresses the importance of the GDC's role in order to realize this goal. Capacity development of GDC is placed as one of the most important strategies in the policy. In this context, the Project, whose purpose is to develop technical capacity of GDC, is exactly in line with the Kenyan governmental policies.

Consistence ODA police	/with Japanese The Con //plan econom	untry Assistance Policy (CAP) for Kenya in 2012 sets the primary goal, which is to "promote sustainable ic and social development" in alignment with Vision 2030. The policy stresses the significance to assist
	infrastru infrastru	acture development including energy sector and notes that Japan pays particular attention on developing acture that can be effective for climate change mitigation such as geothermal power.
	The roll	ing plan attached to the policy also shows the assistance direction, which is to promote stable power supply for
	econom access i	ic development. In the development issue category, the Project is placed as one of the key projects in the "power mprovement" issue. The consistency with the Japanese assistance policy is confirmed in this context.
Consistence	with the needs On the I further satisfy s drilling The Pro evaluate	basis of the governmental policy direction, geothermal development in the country was expected to be promoted with the key organization, GDC. However, at the time before the Project started, GDC had faced difficulties to such technical requirements/expectations. For example, GDC had technical challenges on how to site proper targets; how to strike drilling targets; how to evaluate geothermal resources, and others. ject aims at strengthening technical capacity of GDC from various aspects in a comprehensive manner. It is ad the Project is in line with the needs of GDC and the Kenvan government.
Effectiver	ess Effectiv	zeness of the Project is high.
	Capacit	y development of GDC on nearly all the necessary technical fields for geothermal development was successfully . The effectiveness is evaluated as high.
Progress of	Project purpose The Pro geothern technica evaluati enginee status o data/fig such as Project	ject purpose, which is "to enhance human resources of GDC which contribute to technical risk mitigation in mal development", has been achieved as of the Terminal Evaluation. The Project covered nearly all the necessary al fields towards achievement of the Project purpose, which comprise not only drilling and geothermal resource on but also the fields such as economic/financial analysis, environmental and social monitoring/safeguard, plant ring, and multipurpose use of geothermal resources in the framework of each Output within PDM. Achievement f capacity development was well confirmed by capacity assessment exercises at each technical field as well as ures showing improvement of operation efficiency such as drilling speed. Moreover, if some remaining activities establishment of internal mechanism on human resource development completes, the achievement status of the purpose would be much higher.
Contributio	n factors The Pro 1) Flexi The Pro develop respons in order In this I efforts, 2) Syne There w GDC's geother that they	ject has been progressing owing to these contribution factors. ble assignment of experts in accordance with changes of needs and condition ject flexibly adjusted dispatch of experts according to the changes of GDC's needs and progress of capacity ment. For example, the Project dispatched experts on directional drilling, mud drilling and project management in e to GDC's requests and/or needs, which were not originally planned. Also, both sides decided to modify the R/D to include production of Steam Reports 1 and 2 in order to facilitate the IPP ine, the Project sought expert resources not only in Japan but also in other countries. Owing to these arrangement the Project enabled to make effective inputs. rgy effects with another project vas another project implemented at the same time with almost the same counterparts, "Project for Reviewing Geothermal Development" from November 2014 to June 2017 in northern area. The counterparts engaged in mal resource survey, economic analysis, development of business model and others in the project, which means y had chances to apply what they learned in the Project into the actual field. Such double opportunities enhanced

	the effectiveness of the Project's trainings.
	3) working together with a long term expert stationed in Kenya The Dreiget dispetabel a long term expert in Venya in addition to the expert team. The long term expert enhanced
	he project displation and relationship between the counterparts and the supert team. The long term expert enhanced
	monogement and follow up of the Project activities
	A) Coordination by the Project coordinator and a local coordinator
	4) Coordination by the Project coordinator and a local coordinator The Devicet assigned a project accordinator by Kanyan side, and the HCA asymptot team applicated a local accordinator for
	preparation and coordination of trainings. The coordination works by both of them enhanced smooth implementation of the Project activities.
Inhibition factors	1) Coordination with original job assignment and the Project activities
	Counterparts sometimes faced difficulties to participate in trainings due to conflict with their original job assignment. As
	a result, there were some cases where they were unable to fulfill the minimum requirements to attend trainings. 2) Suspension of the Project activities due to presidential election
	For safety reasons related to presidential election campaign, the Project had suspended dispatching JICA experts for
	several months in 2017. As a result, the Project activities in Kenya were suspended. For example, in the case of drilling
	OJT, they were delayed for nearly one year.
	3) Delay in budget disbursement
	The budget of GDC was sometimes not disbursed at necessary timing especially at Menengai. It caused suspension of fuel
	supply for drilling works and accordingly, the drilling OJT timing was delayed. It led to belated collection of data on
7.001	geothermal
Efficiency	
Japanese side	Japanese side dispatched experts on various technical fields corresponding to targeted techniques and skills of the Project
	(Annex 2). The performance as an expert team was effective for achievement of the expected Outputs and the Project
	On the other hand, there were some challenges observed as follows. The Project dispatched 107 experts in total during the
	Phase 1 and Phase 2. The Project faced challenges in monitoring and management of such significant number of experts
	In addition, it brought administrative burden on contract management among IICA expert team. IICA headquarters and
	Kenvan office for such huge number of expert assignment. As a result, there were some cases that expert dispatch could
	not be in time for the scheduled and/or necessary timing.
	In this relation, the Project could not present the expert dispatch schedule in advance, then, Kenyan side could not make
	prior arrangements for training attendance. It resulted in some counterparts' absence from trainings.
	Considering the character of the Project contents, it is understandable to require various and many experts; however, this
	point should be raised as a part of lessons learned from the Project.
Kanyan sida	Kenyan side has assigned relevant personnel from respective department according to the Project activities. The fact that
Kenyan side	a large number of internal trainers were adequately trained is evidence that counterpart assignment was quite appropriate.
	On the other hand, the counterparts faced difficulties in coordinating original job assignment and the Project activities. It
	gave negative influence on efficiency
	The Project procured a variety of equipment related to field activities and analysis tools including software (Annex 10).

Equipment/Facility	They are evaluated as reasonable inputs for the Project implementation in terms of volume, specification and usability.
Training in Japan	The Project sent a variety of counterparts in training courses in Japan mainly from drilling and reservoir assessment and management field. The training provided the opportunities not only to gain technical knowledge but also to enhance cooperative works such as development of reservoir evaluation model with GRA and GRM. Its co-work during stay in Japan enhanced the quality of reservoir numerical model. As for the drilling field, trainings contents covered technical issues as well as provided chances to visit mud additives supplier. Trainings were well integrated and effectively contributed to enhancing capacity development.
Budget	Budget disourse influenced on the Project activities schedule. The details are described in influenced in factor.
Impact	Impact of the Project is high. Overall goal "GDC properly provides steam to power generation utilities" is possible to be achieved. Not only is the contract with IPP but also facility construction aspect nearly ready to start. A ripple effect occurred in organizational aspect is observed. In this line, the impact is evaluated high.
Positive impact	The following ripple effects by the Project are observed. Promotion of Geothermal Center of Excellence and positioning Kenya as a leading country of geothermal development in East Africa
Organizational aspect	GDC established the Geothermal Center of Excellence in 2017 and started to provide trainings to neighboring countries in East Africa. Most of trainers at the Center are the same personnel of the internal trainers developed through the Project activities. Reputation and highly recognized performance of the Center has pushed forward Kenya as a leading country of geothermal development in the region. GDC staffs made presentation at international conferences.
Negative impact	There are no negative impacts observed.
Sustainability	Sustainability of the Project is moderate. It is likely for Kenyan government to continuously stress importance on geothermal development. The policy aspect has high sustainability. Sustainability of organizational and technical aspects also gives positive prospect. GDC has now many internal trainers with handbooks covering nearly all the necessary technical fields. On the other hand, sustainability of financial aspect is a big challenge. Budget of training for GDC staffs is actually dependent on external support. The budget in 2019 is much more severe than previous years. Considering these aspects, sustainability is evaluated moderate.
Policy aspect	It is likely for Kenyan government to continuously place importance on geothermal development in the country, considering the importance to develop electric power resources that can enhance industrial competitiveness through reduction of energy cost and stable energy supply. The sustainability of policy aspect is evaluated as high.
Organizational and Technical aspect	Sustainability of organizational and technical aspect is almost ensured. GDC already has many internal trainers at various technical fields, which counts to 39 personnel as of the Terminal

Financial aspect	 working fields. They can be functioned as a technical backstop higher if internal trainers' development program and a system established. Financial sustainability is a concern. Reserving budget for trai at last the fiscal year of 2019 could not gain promising budget support and/or internal budgetary arrangement in GDC. The b equipment is also crucial to ensure the quality of works. Meas calibrated by GDC's own budget. However, calibration for air to do so. 	p in GDC4. The sus to link trainings an ining purpose in GE for training. The cu udget for software urement equipment monitoring has no Table 17 A	DC has been tougher for these years, and urrent situation is depending on external license renewal and for calibration of t for water quality and noise has been t been done because it needs higher cost
	Expense on training (Kenva shilling)	Fiscal year	Expense on training (Kenya shilling)
	140,000,000	2013	116,701,527
	120,000,000	2014	87,805,640
	100,000,000	2015	54,980,776
	80,000,000	2016	51,402,520
	40,000,000	2017	70,583,493
	20,000,000	2018	25,285,349
	0	2019	6,010,929
	Figure 1, Actual expense on training in GDC	Source: GDC	
Conclusion	This Project targeting capacity development of GDC through a project for Kenya. The Project meets with the Kenyan policy a therefore evaluated as high. The Project purpose "human resource development of GDC condevelopment" has been achieved. There has been marked impreservoir evaluation and others. Therefore the effectiveness is Efficiency is evaluated as moderate. Japanese side dispatched targeted techniques in the Project. In addition, flexible arrange the Project activities. However, due to immense number of expansion and monitoring. Kenyan side has assigned resourced occasionally had challenges in reserving time to attend trainin	a series of integrate and the needs of the ontributing to techn rovement of drilling evaluated as high. experts on various ement of expert assi perts dispatched, th ful personnel from gs. Delays in budge	ed trainings is a significantly important e government and GDC. The relevance is nical risk mitigation in geothermal g efficiency and quality of works such as technical fields corresponding to ignment has resulted in acceleration of e Project sometimes faced challenges in respective department. But they et disbursement also negatively affected

	the schedule of the Geotherma of achievement high. Sustainab the other hand, Overall, it is co team and GDC evaluation but monitoring/saft On the other ha reserve budget	the Project activities. Impact is observed in organizational aspect. The Project contributed to promoting Center of Excellence from the viewpoint of trainers' development and training contents. The possibility of Overall goal is also expected within 3-5 years after the Project completion. The impact is evaluated ility is moderate. There are no significant concerns on the policy, organizational and technical aspects. On it is difficult to confirm the financial sustainability based on the current budgetary situation. ncluded that the Project has successfully achieved the Project purpose with joint efforts by JICA expert counterparts. Capacity development of GDC was successfully realized not only in drilling and resource also in many technical fields such as economic/financial analysis, environmental and social eguard, plant engineering, and multi-purpose use of geothermal resources. nd, there is a challenge in sustainability especially on financial aspect. It is highly crucial for GDC to for continuous capacity development actions in GDC.
Recomm	nendations Based on the er for GDC, and f	valuation and analysis above, the Team put forward the following recommendations for the Project team, or JICA for further improvement
During th 1) Remainduring the	e Project Period ning activities e Project period Completion Re the progress an	and JICA expert team> ninal Evaluation, the Project team agreed on the actions to be taken in the last three months of the Project: nalization process, (b) finalizing the Steam Report 2, (c) finalizing the draft memo for upgrading the HR ning on internal control, procurement, and micro-earthquake analysis, (e) presentation of the Project port. Considering that the project is closing in end of December, the Project team should closely monitor d communicate among its members so that none of the activities are delayed.
2) Career program	 c development (Output 7) Stablishing a yet completed. explained above aligning to care how they can in The JICA experimentation team how they inten Project team care 	and JICA Project team> system to link and reflect training development to the career development program (indicator 7-5) has not This indicator is especially important in order to assure that the project outcomes are sustained. As e, the JICA expert team has proposed a draft version of a system that links necessary training components er development program in the drilling section. The Team recommends that the GDC HR team consider accorporate the proposed system to their existing HR system. rt team will have one last opportunity to visit Kenya to discuss with the HRD and counterparts. The a recommends that before the next visit of the JICA experts, the GDC HR team develop a draft memo of d to incorporate the proposed system into their existing HR system. During the JICA expert's visit, the n make final revisions to the draft memo to be included in the Project Completion Report.
3) Contin of drillin	nuous improvement g management < For GDC and The Project has For example, th per day in 2018 important achie around 128 day due to downtim Although these on repair and w	JICA expert team > made significant improvements in the key indicators for drilling management. e drilling rate has increased by around 70%, from a baseline of 10.8 meters per day in 2015 to 18.3 meters . This has significant implications for reduction of drilling cost, saving millions of USD per well. Another vement is that frequency of major accidents has drastically reduced from a baseline of one accident per s in 2014 to one accident per around 513 days in 2018. This has major implications for reducing the cost e, not to mention protecting GDC's most valuable assets from tragic accidents. are significant achievements, there is still room for improvement. Some other indicators, such as waiting aiting on logistics management has actually worsened. The increase in waiting time will have implications

	for increase of cost per well. Also, because GDC aims to become an international player, it must further reduce the waiting time, which will be viewed as project and financial risk to project owners. Although there were external factors that affected this outcome, maintenance and logistics plans could be reviewed to better manage external risks. The evaluation team recommends the Project team to review the inventory, maintenance, and logistics plans to better manage external risks and unexpected events, and to reflect the results in the Final Completion Report.
4) Planning for aquinment	< For CDC and UCA appart toom >
a) Flaming for equipment maintenance and software license renewal	As stated in the report, the budget for software license renewal and for calibration of equipment is crucial to ensure the quality of analysis. Currently, it has been observed that the budget allocation for maintenance of equipment and license renewal fee for software are inadequate. Also, the project experienced an inappropriate storage of equipment provided by JICA during project implementation
	The evaluation team recommends the JICA expert team to work together with its GDC counterparts to do the following: (a) The Project team should produce a plan for the coming five years specifying the cost, frequency, and expected schedules for periodical maintenance and license renewals and include the proposed schedule in the Project Completion Report.
	(b) The Project team should discuss how GDC's inventory management could be improved. The results of the discussion should be reported in the Project Completion Report.
5) Handbooks (Output 7)	<for gdc=""></for>
	The eighteen types of handbooks developed in the Project is an important asset to GDC. As an important asset of GDC, the Team recommends that the handbooks to be properly stored, managed, and updated. Preferably, the handbooks should be available to GDC staff whenever and wherever they need to access it. It recommends that for example, GDC uploads the latest handbooks to its intranet so that the staff can access it from their PCs.
After Project completion	1) Securing the training budget (after completion) < For GDC >
	The training budget seems to be on a downward trend since 2013. This is a serious concern to the sustainability of the Project outcomes. In order not to reverse the progress made during the Project, the team strongly recommends GDC management and the Kenyan government to revisit the importance of capacity development. The team considers the brilliant success of Kenya's geothermal development was thanks to the government's continued commitment to human resources development over a long period of time. Kenya is now the region's leading country not only in terms of installed capacity, but also in terms of human resources.
	The Team considers the benefits of its capacity development as follows. The Steam Report 1 that contributed to acceleration of the IPPs process in Menengai would not have been possible without training of the GDC staffs. Also
	GDC staff's capacity to site wells have significantly improved through training.
	This contributed to success rate of borehole drilling to improve. Also, skills for drilling management as well as drilling
	technique improved, which contributed to more successful wells, less external input, less serious accidents, and more
	financial terms. But these benefits cannot be sustained if GDC's investments in human resource development is not
	sustained at adequate levels.
	The Team therefore recommends GDC to calculate the financial benefits of training to its operations and to discuss with
	the management on its importance. 2) Geothermal Center of Excellence and Academia (after completion)

	<for gdc=""> GDC has so far made important and significant contributions to capacity development of geothermal human resources not only in Kenya but in East Africa. It has also made important contributions to the academic community. The Team recommends that GDC continues on this trajectory and utilize its knowledge assets to the fullest extent to expand its influence in this area.</for>
	 3) Environment Management System (EMS) <for gdc=""></for> The JICA expert team trained the GDC Environment team on Environment Management System (EMS) based on GDC's request to acquire an EMS certification. The Project team also developed an implementation schedule to introduce EMS. Acquiring EMS certification is crucial if GDC aims to become an international player in geothermal development. The Team recommends GDC to secure necessary budget for certification and to complete the EMS certification process after Project completion.
Lessons Learned Importance of holding an annual JCC	Holding an annual JCC is more than a formality. It is an opportunity for high-level persons from the Kenyan government, GDC management, and JICA to take stock of the progress as well as to discuss major issues regarding the project. Considering the complexity of the project and strategic and political importance of the project, the JCC should have been held at least once a year. This may have prevented some activities such as Output 7 from being delayed. Also, it would have given an opportunity for high level participants to exchange views on the budgetary issues. In the future projects, project managers of implementing agencies and JICA experts should be given clear responsibility to arrange the JCC at least once a year.
Challenge of managing projects from two different locations	The project locations were divided between Nakuru and Nairobi. Most of the project activities were implemented in Nakuru, but major decisions were made in Nairobi. There was a challenge in sharing the same level of information in the two locations. The long term expert visited Nakuru frequently, and made a detailed report of her findings to the management in Nairobi. This may have improved the flow of information between the two locations. JICA experts could have made a habit of stopping by in Nairobi to report to GDC management after each visit so that the information gap between the two locations could be minimized.
Management of expert teams	Due to a large volume of JICA experts, the JICA expert team and JICA headquarters struggled with contract management. Future projects could consider implementing projects in smaller manageable phases, or cutting down on the number of experts to a manageable size. Utilization of third country experts, such as from the Philippines, proved to be very effective. Similar projects can consider this as an option to enable JICA to respond more effectively to the needs of the counterpart organizations.
Flexibility to meet changing needs of GDC	JICA exercised maximum flexibility to respond to the changes in GDC's needs and progress of capacity development. For example, the Project dispatched additional experts on directional drilling and mud drilling. The new inputs allowed the Project to reach the key performance indicator of the project objective. The success rate of discharging wells improved by 18% (from a baseline of 38% to 45%). The rate of wells reaching target depth improved by 8% (from a baseline of 86% to 93%). It should be noted that 100% of the four wells drilled in 2018 reached the target depth.

	Similarly, both sides decided to modify the R/D in order to include production of Steam Reports 1 and 2 in order to facilitate the IPP. This input was especially important for the Project to achieve the overall goal after project completion, which says "GDC will be able to properly provide steam to power generation utilities." Lessons learned is that the Project should exercise maximum flexibility taking into careful consideration the effect of the changes to the overall goals and project objectives.
(5) PDM base	 In addition, the Project has not kept tracking their activities and progress in the context of PDM and PO as a tool of project management. In other words, PDM and PO have not been paid enough attention, which may have turned to be one of the reasons for some activities delayed such as ones in Output 7. Lessons learned is that future project should make sure that the projects are conducted and reported based on the mutually agreed PDM and PO on a periodical basis. If the reporting is delayed, then both JICA and the implementing agency, as well as the representatives of the JCC, should make sure that the Project submits the reports without delay. As suggested earlier, JCC should be held more than once a year to in order to confirm the progress of the projects based on PDM and PO

6 : Project Flow Chart

添付資料 6: Project Flow Chart



Work concept of capacity building project for geothermal development in Kenya



Conceptual flow for the capacity building project for geothermal development in Kenya





Work Plan Flow Chart (First Term)





Work Plan Flow Chart (Second Term)



Objective 1 flow chart



Objective 2 flow chart



Example of Conceptual Model (Geothermal field in Peru : JICA, 2012)



Example of drilling site selection (Geothermal field in Indonesia : JICA, 2011



Objective 3 flow chart



Objective 4 flow chart



Objective 5 flow chart



Flow of steam & power sales price settings and its necessary knowledge and capacity



Objective 6 flow chart

7 : Plan of Operation

添付資料 7: Plan of Operation

						Р	an of O	ber	ation (I	PO													
Activity	201 9 10 11	3	2 3	4 5 6	2014 7 8 9	9 10 11	1 12 1 2 3 4 5	2015 6 7	8 9 10 11 12 1 2	2 3 4	2016 5 6 7 8 9 10	11 12 1	2017 2 3 4 5 6 7	8 9	10 11 12 1 2	3 4 5	2018 6 7	8 9 10 11	12 1 2	3 4 5	2019 6 7 8	9 10 11	1 12
Output 1. Training program for GDC staff will be established	0 1 2	3 4	5 6	7 8 9	10 11 12	2 13 14	4 15 16 17 18 19 20	21 22	23 24 25 26 27 28 2	9 30 31	32 33 34 35 36 37	38 39 40	41 42 43 44 45 4	5 47 48	49 50 51 52 53	54 55 56	5 57 58 5	59 60 61 62	63 64 65	66 67 68	8 69 70 71	72 73 74	. 75
1-1. Assessment of GDCs human resource development and staff capacity	• • • • •																						
1-2. Abstracting challenges GDC has and compiling measures to improve																							
1-3. Suggest to GDC top-management and determining the direction of training program																							
1.4 Planning training programs																						╧╧╧	+
1-6. Developing check lists and assessment sheet of GDC staff capacity in necessary skills and required geothermal development																							
Output 2. Capacity in developing conceptual models of reservoirs and siting successful drilling targets will be improved																							
2-1. Training in conceptual modeling																						++	
2–2. Training in well siting																							1
Output 3. Capacity to strike drilling targets will be improved																							\perp
3-1. Training in drilling operation																						++	╞
3-2. Training in procurement and logistics management for drilling related equipment																						<u> </u>	1
3-3. Training in health. safetv and environment(HSE)																						++	+
3-4. Training in theory of drilling techniques						T -				+								+++			+	++-	╇
Output 4. Capacity in interpreting wellbore data, establishing calibrated reservoir models evaluating geothermal resources will be improved																							
4-1. Training in well bore data analysis					岸									+ + +								荢	4
4-2. Training in reservoir evaluation			$+\Box$					HE		+++		11		+ + -		+ + +	111	+ + +				++	+
4-3. Training in theory of reservoir engineering			$+\Box$					H-F-									I I I					++	╊
4.4. Training in the database development and handbarent Outputs. Capacity to prepare economically and environmentally viable business plans as a stemp register with the ophered																						++	T
5. 4. Treining in emir compatel al eming 8 april ering																	+++	+++			++++	++	+
5-1. Iraining in environmental planning & monitoring			$+\Box$		\square			8														++-	+
5-2. Training in prant engineering			\square					F		$+ \square$							\Box					++	+
5-5. Training in Economic Analysis																						++-	t
5.5. Training in Dublic Ornerate Pupinsse administration/Einense			tμ																			++	t
5-5. In all hing the Public Corporate Business administration/Finance			$+\square$		HT								\square									++	+
will be enhanced																							
6-1. Identifying multi-purpose use of geothermal energy applicable in Kenyan geothermal prospects																							
6-2. Training in planning projects of multi-purpose use of geothermal energy																							
Output7. CDCs internal mechanism to improve and continue training program will be established																							
7-1. Identifying deficiencies in training materials and programs																							
7-2. Improving training materials and programs						11				+ + +	+++++			1 1				1 1 1					4
7-3. Suggesting revised training programs to GDC top-management and reconfirming GDC s human development policy																							
7-4. Integrating training programs into GDCs human resource development programs																						+++	
Project implementation milestones																							
1. Joint Coordinating Committee (JCC)										Δ											4		Γ
2 Project Review/Evaluation				k olan		Progrees	Report No. 2				Work nian	Demana							Work plan	1		1	Τ
3. Project Reports	++				ress Report	No. 1	Progress Report No	3	Progress Report No.	4	Progress Report	No. 5		Report No	7 Progress Reno	ort No. 8			Prog	ess Report N	10.9	Final	⇇

8 : Project Manning Chart

添付資料 8: Project Manning Chart

Manning Schedule for Phase 1 (in this page: field assignment, in the next page: domestic assignment)



Amando L. Arrieta II										
Drilling Advisor (Driller B)	2									21
Alfonso G. Baena Jr.										
Drilling Advisor (Maintenance Supervisor A)	· #									15
Romeo S.Genis										
Drilling Advisor (Maintenance Supervisor B)	·									21
Alan Y. Astorga	,									
Drilling Advisor (Senior Drilling Engineer A)									8	15
Garry F. Canete	, .									
Drilling Advisor (Senior Drilling Engineer B)	-									15
Randy B. Augusto	,									
Drilling Advisor (Senior Drilling Engineer C)										21
Ray N.Mission	2									
Drilling Advisor (Senior Drilling Engineer D)										21
Graciano Emmanuelito E. Dela Cruz	2									
Drilling Advisor (Drilling Engineer A)										15
Eric C. Jereza	2									
Drilling Advisor (Drilling Engineer B)										15
Michael Ryan C. Barile	2	 					 			
Drilling Advisor (Drilling Engineer C)										21
Felix Alfredo C. Cabrillas	2									
Drilling Advisor (Drilling Engineer D)							1			21

Assignment Ci	lass	2	3	4	5	6	2014	8	9	10	11	12	1	2	3	4	5	2015 6	7	8	9	10	11
Naotsugu IKEDA (Chief Advisor/Drilling Planning)	1	3		5	3		3		3		3				5	•				3		5	
Enrique LIMA	1	3		5	5		3		7	7			1	*		1			5				r
(Propily Ded Molece Evolutional Evolutions) Renning/Seathermal Research Palaeter) Hideo AKASAKO		2	1	s	5		5			1					3	1				1	2		2
(Well Sting)	2	3	4	3	4		3			1			5 1			5				7	7	4	
Laban Kariuki Administration / Training CoordinatorA [Home]	3				3	6									5			-		2			
Takayuki WADA	4								15		в						15	10		15	10		
Shoma SASAKI								3	10		12	4	5	4		5	10		9				
(Drilling Planning B)	-												-										+
(Equipment Procurement)	3	3	3	10	10	5	10	s	5		5	5	2	7	3		5	5	5	2	5	2	
Yoshio SOEDA (Geologist A)	3		5	10	4		20								15							5	
Hiroo YOSHIYAMA	,	3		5			10								4	5	1						5
(Geologist B) Hiroyuki OISHI		3		2	3		2		-	2		2	1	3	2	4		4					
(Geologist C)	3						3			4				4						3	4	5	
(Geochemiat A)	3			10	7		11			-		10	5		10				10			5	
Noriaki UCHIYAMA	3	3		5	4		10		5	11													
(Geochemist B) Tatsuto INO(IWANAGA)		3		4	3		10		7	5	2	2	-	-	5				5				
(Geochemist C)	3			5	5	5	5		2					5			2					-	+
(Geophysicist A)	3	3	3	6	3	7	17			7	5	5	2		5				2			5	
Stephen ONACHA	,						7																
Hiroki SAITO	,							9	21	14													
(Geophysicist C) Kolchiro FUKUOKA										7	5	5											
(Data Integratation/Data Management/Reservoir Modeling)	3			9			16		10	10			5	6					20			5	
Hideki HATANAKA (Wellbore Survey)	,			10	6		14								20								
Masao SHIOTSUKA	3			10	5		10		, , , , , , , , , , , , , , , , , , ,						2								
(Discharge Testing) Masahiko KANEKO			6	4	3			2					15							10	3	4	
(Economic Evaluation) Enrique Yuki LIMA			7 1		9	2			6	3			4	11							6		
ISOMURA (Training CoordinatorC)	•								15									15	17	• • • • • • • • • •	11		
Tomoaki HIROSE	,	3	5					14					20										
Kei OWADA							5	10					20		****						9		
Business Administration/Visance BJ																	2	*					
(Steam Purchase Agreement Promotion)	3		2	3		5	5	7	2					4							7	2	
Tsukasa Yoshimura (Socio-Erwinonmental Considerations)	,		3	10	10		5				10		10						15				
Shatei IRI	,																						
(Socio-Environmental ConsiderationsB) Takeshi YAMAMOTO																				7	50		
(Plant Engleer A)	3		5	10	2	.													10	5		3	2
Masashi HIGO (Plant Engineer A)	3			5	2														10				
Teruaki MATSUO	,			5	2								8						10				
(Plant Engineer C) Norio SHIGETOMI				5							-			-					10				
(Multi-Purpose Use of Geothermal Energy)	2	3	3			2	12	2	2	12	2	2	3		4	2	2	2	10	2	2	2	
Akira KOMATSU (Drilling Advisor)	2					10										10							
Katsuya KIYONO Hitoshi TAKAHASHI Masami SHINOZAKI	2					5																	
(Drilling Advisor)																							
(Drilling Advisor)	2					10										10							
Takayuki KIKUCHI Junichi TOYODA	2					9			•				-			11							<u>-</u>
(Drilling Advisor) Tsuyoshi ABE				5	4	10										10							
(Drilling Advisor) Daliji IKENOMOTO				10		5	10		10	3		-	-			4	15	14					10
(Drilling Advisor)	2																						
Hidenori FUJINUKI Yuji NAKANO Tomoki ABE	2					20	10	10	10							10	10	10					
(Drilling Advisor)									-			-											
(Training Coordinator)	5								5	2	14 5			4					10	34	9		
Yuki FUJII	•										7		7										
Noel D.Cruz	ł																						
Drilling Advisor (Tool Pusher A)																							
Mamerto B. Suasin Jr.	2																						
Edilberto M.Del Valle	2																					5	
Drilling Advisor (Driller A)																							
Drilling Advisor (Drilling Drilling Advisor	2																						
Alfonso G. Baena Jr.	2																						
Drilling Advisor (Maintenance Supervisor A) Romeo S.Genix																							
Drilling Advisor (Maintenance Supervisor B)	2																						5
Alan Y. Astorga	2																						
(Senior Dilling Engineer A) Garry F. Canete																							5
Drilling Advisor (Senior Drilling Engineer B)	2																						
Randy B. Augusto	2																						
(Senior Drilling Engineer C) Ray N.Mission																						5	3
Drilling Advisor (Senior Drilling Engineer D)																							
Dela Cruz	2																						
(Drilling Engineer A) Eric C. Jereza																							
Drilling Advisor (Drilling Engineer B)																							
Michael Ryan C. Barile Drilling Advisor (Drilling Engineer C)	2																						
Felix Alfredo C. Cabrillas	2																						
(Drilling Engineer D)			Expended day(s)			set	heduled day(s)																
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Dispatch Drilling Advisor Tear Seminar for Drilling Technolog	m 87																						
Seminar for Reservoir Evaluati	ion								-Theory of	Stored-heat and Mor 30 Simulation	nte Carlo Simulation								Continuation of Natura	I State Calibration			
Interim Evaluation	1								-General Tr	alning on the Utilizat	tion of Tough 2								Production/Reinjection	History		Δ	
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Manning Schedule for phase 2

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Deputy Ch Planning	ief Advisor/Geothermal Development L/Geothermal Reservoir Evaluation	Enrique LIMA	WEST JAPAN ENGINEERING CONSULTANTS, INC. (WEST JEC)	1									-										1					-								t.						,		
	Well Siting	Hideo AXASARO Hiroo YOSHIYAMA	HEST JAPAN ENGINEERING CONSULTANTS, INC. (HEST JEC)	2																			•	15												-,						•,	\square	
Administ	tration &/Training Coordinator &	Laban Enriuki	Global Syneray Link	э			+								•				-		-	-		•			-	-							•		•		-			-		
	Training Coordinator B	Takayuki WADA	HEST JAPAN ENGINEERING CONSULTANTS, INC. (WEST JEC)	3			30																							<i></i>							1		Ĺ					
	Drilling Planning B	Shoma SASAKI	MEST JAPAN ENGINEERING CONSULTANTS, INC. (MEST JEC)	5																								12													\Box			
	Equipment Procurement	Hiroyuki ISBIGAXI	Japan International Cooperation System (JICS)	з																						-														۰, ۱	• ,			
	Geologist &	Yoshio SOEDA	HEST JAPAN ENGINEERING CONSULTANTS. INC. (HEST JEC)	3									-										•	13				-					-			-								
	Geologist B	Hiroo YOSHIYAMA	MEST JAPAN ENGINEERING CONSULTANTS, INC. (MEST JEC)	3			١,			,	,																					Τ									\square		\square	
	Geologist C	Yuki FUJII	MEST JAPAN ENGINEERING CONSULTANTS, INC. (MEST JEC)	5																													-					-			\square		\square	
	Geochemist A	Koji MATSUDA	HEST JAPAN ENGINEERING CONSULTANTS, INC. (HEST JEC)	3				.					-	•									•					-								-		-			. •		\square	
	Geochemist C	Tatauto 180	LOVE FARTH 21CD., INC	3			Ť	()		1		-						1						1					•, 1						1			\top					\neg	
	Geophysicist A	Witeuro BONDA	WEST JAPAN ENGINEERING CONSULTANTS, INC. (WEST JEC)	3				• .				1	-		1	1		+			1				1			-	1						1			T	\square		. 1	e, İ	\neg	
	Geophysicist B	Tophiyuki TOSBA	Japan Oil, Gas and Metals National Corporation(JOGMEC)	3	\vdash	+	ľ	1	-	+	+	\square		-	+	+	\square	+		+	+		•		+	+		,	+	+	+	+	1	•	+	۲,		+	\square			<u>i</u> t	\neg	\neg
	Geophysicist C	Hiroki SAITO	MEST JAPAN ENGINEERING CONSULTANTS, INC. (MEST JEC)	3	\vdash	+		• .	+	+	1			-	+	+		+		+	+		+	-	+	+		-	+	+	+	+	†		+	÷.		+	\vdash			<u>i</u> t	\neg	
Data	a Integration/Data management	Tomohiro TAKA2000	TEOPS Co., Ltd.	3	\vdash	-	ť	· ·	-	۰.				-	+	+		+	-	+	+		1	-	+	+		-		+	+	+	-		+	+'	-	+	-		H	Ĥ	-	
Hellbore	Survey/Discharge Testing/Reservoir	Hideki HATANAKA	HEST JAPAN ENGINEERING CONSULTANTS, INC. (HEST JEC)	3	\vdash	+	+		-	- '	+	11	,	-	+	+		+	-	+	+		1	-	+	+		14	-	+	+	+	-	_	+	+	-	+	-	-	H	. 1	$ \rightarrow $	
	Modeling A Economic Evaluation	Magabiko KANEKO	HEST JAPAN ENGINEERING CONSULTANTS, INC. (HEST JEC)	2	\vdash	+	+	\vdash	-	+	+		11	+	+	+		+		+	+		-	13	-	+		1	7	+	+	+	-	11	+	+'	4	+	+	H	\vdash	-	\vdash	-
	Training Coordinator C	Earique Yuki LIMA ISOMIRA	HEST JAPAN ENGINEERING CONSULTANTS, INC. (HEST JEC)	5	H		-			+	+		\vdash	+	+	+		+	+	+	+	11	4	-	- 14	۰.			_	+	+	+	+		+	+	+	+	+	H	\vdash	\square	\vdash	
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	UPIIIINE Advisor &	Masashi 194YA	S& Engineering Co., Ltd.		\vdash	4 21	-		_	+	+			-	-	+		-	-	+	-	\vdash	-	+	+	,	29	_	-	+	+	+	-		-	+	+	+	+	-	\vdash	\square	\vdash	_
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Mork	Drilling Advisor F	Yuji NAKANO	Nittetsu Mining Consultants Co., Ltd.	5			,	31	14	_						_				_			_	_	_							_						\perp	_		\square		\vdash	
	Toolpusher A	Noel D.Cruz	ThermaPrime: TP	s		30 5	25		17	_																23	,	24	,	28								_			\square		\square	
	Maintenance Supervisor A	Romeo S.Genis	ThermaPrime: TP	5		10 5	25		17																	29	,	24	,	26								\perp			\square			
1	Senior Drilling Engineer &	Michael Ryan C. Barile	ThermaPrime:TP	5		30 5	25		17																	28	7	24	2	26														
	Toolpusher B	Mamerto B.Suasin Jr.	ThermaPrime: TP	s		, 2		11																			26		25															
	Maintenance Supervisor B	Alfonso G.Baena Jr. Randy S.Day	ThermaPrime: TP	s				22																			21	,	25							_		\perp			\square		\vdash	
4	Senior Drilling Engineer B	Garry F. Gamete Gratiano Emanuelito E. Dela Cruz III Comredo Jr. W. Abanilla	ThermaPrime:TP	s		, -		22																			28		23															
	Mud Engineer	Yoshitaka ISBIKAMA	Telnite Co., Ltd.	4				۰, •	•.																			10	17	,														
	Drilling Engineer	Edralin C.Icabales	ThermaPrime: TP	s																																								
	Project Management A	Kazuki TAKEJCHI Takuji OKAMURA Andrew DE CASTRO	Japan International Cooperation Sputem (JICS) Japan International Cooperation Sputem (JICS) WEST JAPAN ENGINEERING CONSULTANTS, INC. (WEST JEC)	2																																								
	Project Management Bl	Tutaka WIKI	The Japan Research Institute, Limited	3			1		-							1		1			1			1	1	1			-		1				1			T	\square	H	\square	\Box	\neg	
	Project Management B2	Koichiro DANNO	The Japan Research Institute, Limited	4	\square	+	\top	\square	•	+	-			-	+	\top	\square	+	+	-	\square		+	+	+	\top			-	+	+	1	\square		+	+	+	\top	\square			\neg	\neg	
	Project Management C	Yoko CHIVERS	Sumitomo Mitaui Banking Corporation	3	\square	-	+		•	+	-			-	+	+		-	-	+	+		+	+	+	+			-	+	+	+			+	+	+	+	-	1			\neg	
Multi-pu	rpose Use of Geothermal Energy A	Norio SHIGETONI	Mitsubishi Research Institute Inc.	2	\vdash	+	+	\square	-		+			-	+	+	\square		-	+	+		+	+	+	+			+	+	+	+	\square	\square	+	+	+	+	\square		\square	\neg	\neg	\neg
Basi	ness Administration/Finance A	Tomoaki HIROSE	Mitsubishi Research Institute Inc.	3	\vdash		-	\square	-		-		. +		+	-	\square	+	1	-	-		+	+	-	+			+	+	+				+	+	-	+	\square	H		\square	\neg	
Envir	onmental and Social Safeguard &	Magako TERAMOTO	Nippon Koei Co., Ltd.	3	\vdash	+	+	\square	-		-		1	÷		+	\square	+	+	+	t	-	+	+	+	+			+	+	+	+	\square	\vdash	+	+	+	+	\square			$ \rightarrow $	\neg	\neg
Envir	onmental and Social Safeguard B	Shatei IRI	HEST JAPAN ENGINEERING CONSULTANTS, INC. (WEST JEC)	3	\vdash	+	+	\square	-	-		-	\vdash	-		+	\square	+	+	+	-	-	+	-	•	+			+	+	+	+			+	+	-	+	1	1	\vdash	\neg	+	\neg
	Power Plant Engineering &	Takeshi TAMAMOTO	HEST JAPAN ENGINEERING CONSULTANTS, INC. (WEST JEC)	3	-	+	+	\square	15	+'	+	ľ		-	+	+	\square	+	+	+	+	-	•	+	-				+	+	+	+	+	\vdash	+	+	+	+	\vdash	H	\vdash	+	\vdash	\neg
	Power Plant Engineering B	Tatgunari HAYASHI	HEST JAPAN ENGINEERING CONSULTANTS, INC. (WEST JEC)		1	+	+	\vdash	-	- 1	- 10		\vdash	'	+	+	\square	+	+	+	-	,	10	+	15	+			+	+	+	+		\vdash	+	+	+	+	\vdash	H	\vdash	\dashv	\vdash	\neg
	Power Plant Engineering C	Teruaki MATSDO	HEST JAPAN ENGINEERING CONSULTANTS, INC. (WEST JEC)	3	\vdash	+	+	\vdash	+	+	- 10			•	+	+	\square	+	+	+	+		•	+	۰.	•			+	+	+	+	\vdash	\vdash	+	+	+	+	\vdash	H	\vdash	\vdash	\vdash	\neg
	Power Plant Engineering D1	Tijo John Thoman	Tokogawa Electric Corporation	5	\vdash	-	+	\vdash	+	+	10	\vdash	\vdash	,	+	+	\vdash	+	+	+	+	1	10	+	- 15	+			+	+	+	+	+	\vdash	+	+	+	+	\vdash	ť	\vdash	+	\vdash	-
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Planning/Geothermal Repervoir Evaluation	Enrique LIMA	WEST JAPAN ENGINEERING CONSULTANTS, INC. (WEST JEC)	1																											i							
B-11 October	Hideo AXASARO	NOT THEM PROTOTOLIC CONCILINATE THE OWNER INC.		1		+	10	+	+	+	-	,	,	++			2 1	4	-			1 1	\vdash	· ·		++	'	1 2	+++	<u> </u>		+	++			-	4 2.7
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Administration &/Training Coordinator &	Laban Kariuki	Global Synergy Link	3	17.1		171	- 1-		- I	- 1-		17 1	- -	1.1.	- -	1 1	- 1-		-				171			171	-1	- -	171	(T)	- 1-	1				171	
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Administration B	Tetsu IKEDA	HEST JAPAN ENGINEERING CONSULTANTS, INC. (HEST JEC)	3	۰,	•, •,	•	· ·	, ,	•, •	•, •	5 5	5	5 2	5	5 5	5			-																4 2		-
Training Coordinator B	Takayuki WADA	MEST JAPAN ENGINEERING CONSULTANTS, INC. (MEST JEC)	э																											i				7.1	1 1		
Drilling Planning B	Shoma SASAKI	HEST JAPAN ENGINEERING CONSULTANTS, INC. (HEST JEC)	5																		-		-	-			-			\square				1			
Equipment Procurement	Hirozoki [SHIGAX]	Japan International Cooperation System (JICS)	3				-	-		+		+ +		++	-						++	,	F' I	-	+		-		++	-	-	• •	\square	-	· •	+	_
Gaologiet &	Tophia SOFDA	HEST JAPAN ENGINEERING CONSULTANTS INC. (HEST IEC)	3		•	+	-	-	•	+	-	-	-	•	-		-		•		•		-		-	-	•	• •	+-+			÷	• •	- 17	. :	-	-
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Geologist B	Hiroo YUSHIYAMA	WEST JAPAN ENGINEERING CONSULTANTS, INC. (WEST JEC)	3		\vdash	+		-1-	5	+		,	_	++			,	2	5	_	+	_	\vdash			\vdash	_	-	+	2		+-	\vdash	-	_	+	_
Geologist C	Yuki FUJII	WEST JAPAN ENGINEERING CONSULTANTS, INC. (WEST JEC)	5															•							•		•	•		-							
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Geochemist B	Noriaki UCHIYAMA	MEST JAPAN ENGINEERING CONSULTANTS, INC. (MEST JEC)	2	-		+	_		+_+	_		+	-	+	+	+	7	-		_	+			_	+-		_	+	+	\vdash	4	1	\vdash	1	1	1	1 1
Geochemist C	Tatsuto 190	LOWE EARTH 21CO INC	3			+		_		•		\square		\downarrow		\square			5					; ;	,			\rightarrow	\square	\square	\perp	_	\square	\rightarrow		\square	
Geophymicist A	Mitsuru HONDA	HEST JAPAN ENGINEERING CONSULTANTS. INC. (HEST JEC)	3		,		-		•	•,	-			5		-	5	2	-		2	2 4	-	; ;			•	,		-	1 1	2		-	4 2		
Geophymicist B	Toshiyuki TOSEA	Japan Oil. Gas and Metals National Corporation(JOGMEC)	з																•	; ;	-		•			-			•					1	-		
Geophymicist C	Hiroki SAITO	WEST JAPAN ENGINEERING CONSULTANTS, INC. (WEST JEC)	3			- 1	-		-	+	-	+				-	-		-	•	11	-	[-]		-	\vdash	-	-	-	•		• •	•	- 1		-	• •
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Data Integration/Data management	Tomohiro TAKAZUNO	INUPS Co., Ltd.	3				_	6	1	,	_	3	_		5	+	_	-		_	1	5	\square	1 1	-	8.4		_	+	\vdash		+-	+	_		+	_
Wellbore Barvey/Discharge Testing/Beservoir Modeling A	Hideki HATANAKA	HEST JAPAN ENGINEERING CONSULTANTS, INC. (HEST JEC)	3		,			_		,	4 3	5		10	1 5		3 5	3	,	5 2	\square		\square	•		\square			1	-	2 2	2			3 2		0.7
Reservoir Modeling B	Norihide MAEDA	HEST JAPAN ENGINEERING CONSULTANTS, INC. (WEST JEC)	5															-	•	-											2 2	2		•			
Economic Evaluation	Magahiko KANERO	HEST JAPAN ENGINEERING CONSULTANTS, INC. (HEST JEC)	2							•	•	-	-					-	-											\square							
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Training Coordinator C	Enrique Yuki LIMA ISOMURA	HEST JAPAN ENGINEERING CONSULTANTS, INC. (WEST JEC)	5																																		
S Delline Abiens A	Akira HOMATSU	CK Projection Co. 144		,	1 2	-	, ,		10	·	,	++		++'	10	,	12		<u>'</u>	3 3	-	3	· ·		2	4	<u>'</u>	2 2	+ +	\rightarrow	+	+	\vdash	· · ·		2	1 1.2
C Drilling Advisor A	Masashi 198YA	SK Engineering Co., Ltd.	2			+	_	-		-		\vdash	_		_		_		$ \rightarrow $		\downarrow	_	$ \rightarrow $	-	-	$ \rightarrow $	_	_		\mapsto	_	_	\vdash	-	_	+	'
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Drilling Advisor C	Teruaki BOBAYASHI	Bets Co., Ltd.	2																				,	,													
Drilling Advisor D	Wington R. Captillo	ThermaPrime: TP	2																																		
Drilling Advisor E	Tauroshi ABE	Bets Co., Ltd.	2		• •	-	• •	•	•	•					-						+	-		-	• •		-	-	++	$ \rightarrow $	-	+	\square	-	-	+	_
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Maintenance Supervisor A	Romeo S.Genis	ThermaPrime: TP	2		,		;																						\square				\square		3 7	*	
Senior Drilling Engineer A	Michael Ryan C. Barile	ThermaPrime: TP	2				;		ΙT	T		ΙT		I T							ΙT					ΓT	T			iΤ			ΙT		; ;	•[]]	
Mud Engineer	Yozhitaka ISEIKAMA	Telnite Co., Ltd.	4				•																			•				\square							
	Kazuki TAKEUCHI	Japan International Cooperation System (JICS)	+			+		,		+	-	++	-	++	-	+		-		+	++		\vdash	<u>, </u>	2.4	+'+	+	+	++	\rightarrow	+	+	\vdash	+	-	+	_
Project Management A	Takuji OKANURA	Japan International Cooperation System (JICS)	2																																		
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Project Management B1	Tutaka MIKI	The Japan Research Institute, Limited	3	-	\vdash	+	_	,	\vdash	_	_	+		+	+	+	_		\vdash	_	+	_	\square	_	-	\vdash	_	\rightarrow	+	\vdash	\rightarrow	+	\square	\rightarrow	\rightarrow	+	\rightarrow
Project Management B2	Koichiro DANNO	The Japan Research Institute, Limited	- 4						<u> </u>	•	3												\square			\square			\perp	\square	\perp	_	\square			\perp	
Project Management C	Toko CHIVERS	Sumitomo Mitsui Banking Corporation	3						F	,	3																										
Multi-purpose Use of Geothermal Energy #	Norio SEIGETONI	Mitsubishi Research Institute Inc.	2					•		•				•		•																					
Multi-purpose Upe of Geothermal Factory B	Takayophi KITADA	Mitsubishi Regearch Institute Inc.	3			+			<u>+ †</u>		-	-	-	11	+	11	-	-	•	-	+		\square		-	+			+	\vdash	+	+	\square	+	+	+	
Robinson Administration/Energy 4	Tomonki HIDOSE	Vitashishi Rasarah Instituta Ina	-	\vdash		+	•	•	\vdash	+	+	+++	-	 -	+	+		2		-	++	-	\vdash	-	+	\vdash	-	+	+ +	+	+	+	\vdash	+	+	+	+
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Business &dministration/Finance B	RARIRO TAMAZUE	Mitsubishi Kesearch Institute Inc.	3		\vdash	+	-		+	_	1 1	+		+	+	+		17	\vdash	_	+		\vdash	_	+	\vdash	_	+	+	\vdash	+	+	\vdash	\rightarrow	+	+	_
Environmental and Social Safeguard &	Massako TERAMOTO	Nippon Koei Co., Ltd.	3			+			\square			\square		+		\square					\square		\square			\square			\downarrow	\square	\perp	_	\square	_		\perp	
Environmental and Social Safeguard B	Shatei IRI	HEST JAPAN ENGINEERING CONSULTANTS, INC. (WEST JEC)	3						5	:								-	-	-	-																
Power Plant Engineering &	Takenhi TAMAMOTO	HEST JAPAN ENGINEERING CONSULTANTS, INC. (HEST JEC)	3						•		-		•			•						-								T							
Power Plant Engineering B	Tatgupari HAYASHI	HEST JAPAN ENGINEERING CONSULTANTS, INC. (WEST JEC)	э	É					•													1								\square	\top	-		-	-		
Power Plant Engineering C	Teruaki WATSID	HEST JAPAN ENGINEERING CONSULTANTS. INC. (MEST TEC)	3			+	+		•		-	+	• •	++	+	-	-			•	++	-	\vdash	-	+	\vdash	-	+	+ +	+	+	+	++	+	+	+	
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Drilling Training Coordinator B	Tetau IKEDA		5																																		
Drilling Training CoordinatorD	Shona SASAKI	HEST JAPAN ENGINEERING CONSULTANTS, INC. (HEST JEC)	5				+	-	+																					i	- -	1					
Drilling Training CoordinatorE Drilling Training CoordinatorA	Koji TSUNEKAMA Yohei ITO		8																											11							
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Was a F		Conceptual Modeli	ng Trainin																												12	F	戸上				
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9 : List of Dispatched Experts

添付資料 9: List of Dispatched Experts

First Phase

Nam	e	Assignment	Period	Dispatched Davs	M/M	Office affiliated
			2014/2/21 ~ 2014/3/8	16days	0.53M/M	
			2014/3/22 ~ 2014/4/10	20days	0.67M/M	
			2014/7/20 ~ 2014/8/6	(13days)	0.43M/M	
			2014/11/29 ~ 2014/12/14	16days	0.53M/M	
Naotsugu	IKEDA	Chief Advisor / Drilling	$2015/1/24 \sim 2015/2/20$	28days	0.93M/M	West JEC
			2015/3/7 2015/4/5	30days	1.00IVI/IVI	
			$2015/8/22 \sim 2015/8/31$	10days	0.33M/M	
			2015/10/24 ~ 2015/11/7	15days	0.50M/M	
			2015/11/21 ~ 2015/11/29	9days	0.30M/M	
			2014/2/21 ~ 2014/3/8	16days	0.53M/M	
			2014/8/2 ~ 2014/8/23	(15days)	0.50M/M	
Enrique	LIMA	Deputy Chief Advisor	2014/11/22 ~ 2014/12/6	(8days)	0.27M/M	West IFC
2		Deputy emerilation	2015/1/28 ~ 2015/2/7	11days	0.37M/M	
			2015/5/23 ~ 2015/5/30	8days	0.27M/M	
			$2015/8/22 \sim 2015/9/6$	16days	0.53M/M	
			$2014/2/22 \sim 2014/3/8$	15days	0.50101/101	
Hideo	AKASAKO	Well Siting	2015/1/24 $2015/2/82015/5/16 \sim 2015/5/30$	15days	0.55IVI/IVI	West JEC
			2015/8/22 ~ 2015/9/6	16days	0.53M/M	
			2014/2/26 ~ 2014/3/3	6days	0.20M/M	
			2014/3/24 ~ 2014/3/28	5days	0.17M/M	
			2014/4/10 ~ 2014/4/17	(5days)	0.17M/M	
			2014/5/27 ~ 2014/5/28	2days	0.07M/M	
			2014/6/6 ~ 2014/6/7	2days	0.07M/M	
			2014/7/22 ~ 2014/7/25	4days	0.13M/M	
		Local Droject	2014/8/11 ~ 2014/8/11	1days	0.03M/M	
Laban	KARIUKI	Coordinator/OJT	2014/11/25 ~ 2014/11/29	5days	0.17M/M	GSL
		Coordinator A	2014/12/16 ~ 2014/12/30	(4days)	0.13M/M	
			2015/1/29 ~ 2015/1/30	2days	0.07M/M	
			$2015/2/8 \sim 2015/2/1/$	(5days)	0.1/M/M	
			$2015/3/6 \sim 2015/3/7$ $2015/8/9 \sim 2015/8/12$	2days 4days	0.1314/14	
			$2015/9/27 \sim 2015/9/30$	4days	0.13M/M	
			2015/10/23 ~ 2015/10/31	(6days)	0.20M/M	
			2015/11/9 ~ 2015/11/26	(8days)	0.27M/M	
			2014/3/22 ~ 2014/4/22	32days	1.07M/M	
Takayuki	WADA	Training Coordinator B	2014/12/13 ~ 2015/1/14	33days	1.10M/M	West JEC
			2015/4/16 ~ 2015/4/26	11days	0.37M/M	
			2014/2/23 ~ 2014/3/9	15days	0.50M/M	
			2014/8/16 ~ 2014/9/7	23days	0.77M/M	
Hiroyuki	ISHIGAKI	Equipment Procurement	2015/1/17 ~ 2015/2/1	16days	0.53M/M	JICS
			2015/8/22 ~ 2015/9/4	14days	0.47M/M	
			2015/10/11 ~ 2015/10/24	14days	0.47M/M	
Voshio	SOEDA	Goologist A	$2014/2/22 \sim 2014/3/8$	15days	0.50101/101	Wost IEC
103110	JOLDA	Geologist A	2014/8/2 $2014/8/23$	(11days)	0.75101/101	West JLC
			2013/1/20 2013/2/13	22davs	0.73M/M	
Hiroo	YOSHIYAMA	Geologist B	2015/1/20 ~ 2015/2/8	20days	0.67M/M	West JEC
		5	2015/5/9 ~ 2015/5/30	22days	0.73M/M	
Hirovuki		Goologist C	2014/8/2 ~ 2014/8/10	9days	0.30M/M	West IEC
пітоуцкі	ОІЗПІ	Geologist C	2015/1/28 ~ 2015/2/8	12days	0.40M/M	west JEC
			2014/2/22 ~ 2014/3/8	15days	0.50M/M	
			2014/8/2 ~ 2014/8/23	22days	0.73M/M	
Којі	MATSUDA	Geochemist A	2015/1/20 ~ 2015/2/1	13days	0.43M/M	West JEC
			2015/5/9 ~ 2015/6/7	(14days)	0.47M/M	
			$2015/8/22 \sim 2015/9/6$	16days	0.53M/M	
Noriaki		Geochemict P	2015/4/18 ~ 2015/4/26	(16days)	0.50101/101	West IEC
NUTIAN	UCHIANA		2014/10/10 $2014/11/92014/2/22 \sim 2014/11/9$	15days	0.55101/101	WEST JEC
			2014/8/2 ~ 2014/8/23	22davs	0.73M/M	
Tatsuto	IWANAGA	Geochemist C	2014/10/11 ~ 2014/11/1	22davs	0.73M/M	KYUDEN.
			2015/5/23 ~ 2015/6/14	23days	0.77M/M	
			2015/9/12 ~ 2015/10/4	23days	0.77M/M	
Mitsuru	HONDA	Geophysicist A	2014/2/22 ~ 2014/3/8	15days	0.50M/M	West JEC

			2014/8/2 ~ 2014/8/23	22days	0.73M/M	
			2014/11/2 ~ 2014/11/23	(8days)	0.27M/M	
			2015/1/20 ~ 2015/2/8	20days	0.67M/M	
Stenhan	Onacha	Geophysicist B	2014/8/4 ~ 2014/9/8	(27days)	0.90M/M	GEOSTER
Stephan	Offactia	deophysicist b	2014/10/3 ~ 2014/10/27	(17days)	0.57M/M	GEOSTEF
			2014/8/2 ~ 2014/8/16	15days	0.50M/M	
Hiroki	SAITO	Geophysicist C	2014/11/15 ~ 2014/11/30	16days	0.53M/M	West JEC
			2015/1/24 ~ 2015/2/1	9days	0.30M/M	
			2014/2/21 ~ 2014/3/8	16days	0.53M/M	
			2014/8/4 ~ 2014/8/31	(21days)	0.70M/M	
Katabtaa	FURLIOKA	Data Integratation/	2015/1/17 ~ 2015/2/8	23days	0.77M/M	
Koichiro	FUKUOKA	Data Management/	2015/5/9 ~ 2015/5/30	22days	0.73M/M	West JEC
		Reservoir Wodening	2015/6/6 ~ 2015/6/27	22davs	0.73M/M	
			2015/8/22 ~ 2015/9/6	16days	0.53M/M	
			$2013/3/22 \sim 2013/3/8$	15days	0.50M/M	
Hidaki	ματανιακά	Wallborg Survey	2014/2/22 $2014/3/0$	(20days)	0.50101/101	Wort IEC
HIGCKI		Wendore Survey	2014/8/4 $2014/8/30$	(200ays)	0.07101/101	West JLC
Masao		Dischargo Testing	2013/3/9 $2013/3/30$	22uays	0.73101/101	West IFC
IVIASAU	SHIUTSUKA	Discharge festing	2014/8/4 2014/8/23	2008ys	0.67101/101	West JEC
			2014/4/6 ~ 2014/4/19	14days	0.4/M/M	
Masahiko	KANEKO	Economic Evaluation	2014/9/13 ~ 2014/9/2/	15days	0.50M/M	West JEC
			2015/2/22 ~ 2015/3/7	14days	0.47M/M	
		-	2015/10/4 ~ 2015/10/11	8days	0.27M/M	
			2014/3/22 ~ 2014/4/22	32days	1.07M/M	
Enrique Yuki		Training Coordinator C	2014/8/2 ~ 2014/9/13	43days	1.43M/M	West IFC
Eninque Tuki	LINKISONIONA		2014/11/15 ~ 2014/12/6	(15days)	0.50M/M	West JLC
			2015/1/10 ~ 2015/3/25	75days	2.50M/M	
			2014/4/6 ~ 2014/4/19	14days	0.47M/M	
Tourseald	LUDOCE	Business	2014/8/30 ~ 2014/9/13	15days	0.50M/M	
Iomoaki	HIROSE	Administration/Finance A	2015/3/7 ~ 2015/3/22	16days	0.53M/M	MRI.
			2015/10/3 ~ 2015/10/17	15days	0.50M/M	
		Business	2014/8/30 ~ 2014/9/13	15days	0.50M/M	
Kei	OWADA	Administration/Finance B	2014/3/9 ~ $2014/3/13$	15days	0.50M/M	MRI.
			2013/3/5 $2013/3/23$	15days		
Tomovuki		Steam Purchase Agreement	2014/4/5 2014/4/19	15days	0.50101/101	KIC .
тотпоучкі	IAJIMA	Promotion	2014/9/13 2014/9/27	15days	0.50101/101	KIC.
		I	2015/2/21 ~ 2015/3/7	15days	0.50M/M	
Techene	VOCULATION	Socio-Environmental	2014/2/23 ~ 2014/3/9	15days	0.50M/M	
Isukasa	YOSHIMURA	Considerations	2014/7/20 ~ 2014/8/3	15days	0.50M/M	NIPPON KOEI CO., LTD.
			2014/11/29 ~ 2014/12/13	15days	0.50M/M	
Masako	TERAMOTO	Socio-Environmental	2015/8/7 ~ 2015/8/22	16days	0.53M/M	NIPPON KOEI CO., LTD.
		Considerations	2015/10/3 ~ 2015/10/17	15days	0.50M/M	
Shatei	IRI	Socio-Environmental	2015/9/12 ~ 2015/9/19	8days	0.27M/M	West JEC
		Considerations			•- <u>-</u> ,	
			2014/2/22 ~ 2014/3/8	15days	0.50M/M	
Takeshi	ΥΑΜΑΜΟΤΟ	Plant Engineering A	2015/2/14 ~ 2015/2/28	15days	0.50M/M	West IFC
rancom			2015/5/23 ~ 2015/5/30	8days	0.27M/M	110507201
			2015/8/29 ~ 2015/9/19	22days	0.73M/M	
Masashi	нісо	Plant Engineering B	2015/2/14 ~ 2015/2/28	15days	0.50M/M	West IEC
IVIdSdSIII	moo	Fiant Engineering D	2015/8/29 ~ 2015/9/19	22days	0.73M/M	West JEC.
Toruaki	ΜΑΤΩΙΙΟ	Diant Engineering C	2015/2/14 ~ 2015/2/28	15days	0.50M/M	West 150
Teruaki	MAI 300	Plant Engineering C	2015/8/29 ~ 2015/9/19	22days	0.73M/M	west JEC.
			2014/7/20 ~ 2014/8/3	15days	0.50M/M	
			2014/11/29 ~ 2014/12/13	15days	0.50M/M	
Norio	SHIGETOMI	Multi-purpose Use of	2015/3/28 ~ 2015/4/11	15days	0.50M/M	MRI.
		Geothermal Energy	2015/6/27 ~ 2015/7/11	15davs	0.50M/M	
			2015/10/11 ~ 2015/10/25	15days	0.50M/M	
lun-ichi	SASAKI	Drilling Advisor	2014/3/23 ~ 2014/4/22	31 days	1.03M/M	SKE
			$2014/11/29 \sim 2014/12/14$	16days	0.53M/M	•
			$2014/12/27 \sim 2015/1/25$	30days	1.00M/M	
Akira	KOMATSU	Drilling Advisor	$2014/12/27 \approx 2015/1/25$	20 days	1.0014/14	SKE.
			2015/2/7 $2015/5/6$	16 days		
			2013/3/21 = 2013/4/3	21 days	1.0204/04	
Katsuya	KIYONO	Drilling Advisor	2014/3/23 $2014/4/22$	STUGAS	1.0014/14	GOE.
Litoch:	ТАИАЦАСИ	Drilling Advisor	2014/11/29 2014/12/28	SUUdyS		COF
Macami			2015/1/11 2015/2/8	2903/S	0.9/IVI/IVI	GUE.
iviasami	STIINUZAKI		2015/2/22 ~ 2015/3/22	29days	0.9/M/M	GOE.
rosninide	IVIINAIVII	Drilling Advisor	2015/3// ~ 2015/4/5	30days	1.00M/M	TDC
T 1			2014/3/23 ~ 2014/4/22	31days	1.03M/M	
Takayuki	KIKUCHI	Drilling Advisor	2014/11/29 ~ 2014/12/14	16days	0.53M/M	MMTEC
			2014/12/27 ~ 2015/1/25	30days	1.00M/M	
Jun-ichi	ΤΟΥΟΠΑ	Drilling Advisor	2015/2/7 ~ 2015/3/8	30days	1.00M/M	MMTFC
			2015/3/21 ~ 2015/4/5	16days	0.53M/M	

1			2014/12/14 ~ 2015/1/11	29days	0.97M/M	
			2015/1/24 ~ 2015/2/10	18days	0.60M/M	
			2015/3/7 ~ 2015/4/5	30days	1.00M/M	
			2015/10/24 ~ 2015/11/6	14days	0.47M/M	
Daiji	IKENOMOTO	Drilling Advisor	2015/11/3 ~ 2015/11/28	26days	0.87M/M	Bets Limited
Hidenori	FUJINUKI	Drilling Advisor	2014/2/22 ~ 2014/3/8	15days	0.50M/M	NMCC.
			2014/3/23 ~ 2014/4/22	31days	1.03M/M	
Yuji	NAKANO	Drilling Advisor	2015/1/11 ~ 2015/2/8	29days	0.97M/M	NMCC.
			2015/2/22 ~ 2015/3/22	29days	0.97M/M	
TOMOKI	ABE	Drilling Advisor	2014/11/29 ~ 2014/12/28	30days	1.00M/M	NMCC.
Noel D.	Curz	Tool Pusher A	2015/10/24 ~ 2015/11/15	23days	0.76M/M	ThermaPrime.
Mamerto B.	Suasin Jr.	Tool Pusher B	2015/11/8 ~ 2015/11/28	21days	0.70M/M	ThermaPrime.
Edilberto M.	Del Valle	Driller A	2015/10/24 ~ 2015/11/15	23days	0.76M/M	ThermaPrime.
Amando L.	Arrieta II	Driller B	2015/11/8 ~ 2015/11/28	21days	0.70M/M	ThermaPrime.
Alfonso G.	Baena Jr.	Maintenance Superintendant A	2015/10/24 ~ 2015/11/15	23days	0.76M/M	ThermaPrime.
Romeo S.	Genis	Maintenance Superintendant B	2015/11/8 ~ 2015/11/28	21days	0.70M/M	ThermaPrime.
Alan Y.	Astorga	Senior Drilling Engineer A	2015/10/24 ~ 2015/11/15	23days	0.76M/M	ThermaPrime.
Garry F.	Canete	Senior Drilling Engineer B	2015/10/24 ~ 2015/11/15	23days	0.76M/M	ThermaPrime.
Randy B.	Augusto	Senior Drilling Engineer C	2015/11/8 ~ 2015/11/28	21days	0.70M/M	ThermaPrime.
Ray N.	Mission	Senior Drilling Engineer D	2015/11/8 ~ 2015/11/28	21days	0.70M/M	ThermaPrime.
Graciano Emmanuelito	E. Dela Cruz	Drilling Engineer A	2015/10/24 ~ 2015/11/15	23days	0.76M/M	ThermaPrime.
Eric C.	Jereza	Drilling Engineer B	2015/10/24 ~ 2015/11/15	23days	0.77M/M	ThermaPrime.
Michael Ryan	C. Barile	Drilling Engineer C	2015/11/8 ~ 2015/11/28	21days	0.70M/M	ThermaPrime.
Felix Alfredo	C. Cabrillas	Drilling Engineer D	2015/11/8 ~ 2015/11/28	21days	0.70M/M	ThermaPrime.
			Total	2827days	94.19M/M	
Second Phase

Na	me	Assignment	Period		Dispatched	N4/N4	Office affiliated
Nai		Assignment	2016/4/23 ~ 20	016/5/8	16days	0.53M/M	Once anniated
			2016/6/19 ~ 20	016/7/7	19days	0.63M/M	
			2016/7/28 ~ 202	016/8/11	15days	0.50M/M	
			$2016/8/29 \sim 2010$	16/11/20	21days Adays	0.2014/14	
			2018/3/21 ~ 201	10/11/20	5days 5days	0.16M/M	
Naotsugu	IKEDA	Chief Advisor/Drilling	2018/4/15 ~ 202	018/4/22	8days	0.27M/M	West JEC
			2018/6/2 ~ 201	18/6/15	14days	0.47M/M	
			2018/7/21 ~ 20	018/8/5	16days	0.53M/M	
			$2018/8/22 \sim 20$ $2018/10/12 \sim 201$	18/10/20	16days	0.531/1/1/	
			2019/2/3 ~ 201	19/2/13	11days	0.37M/M	
			2019/6/9 ~ 201	19/6/16	8days	0.27M/M	
			2016/4/20 ~ 202	016/4/24	5days	0.16M/M	
			2016/7/23 ~ 202	016/7/30	8days	0.27M/M	
		Doputy Chief	$2016/11/12 \sim 201$	16/11/20	9days 8days	0.30M/M	
		Advisor/Geothermal	2017/2/12 20.	17/4/29	8days	0.27M/M	
Enrique	LIMA	Development Planning/Geothermal	2017/9/23 ~ 202	017/9/30	8days	0.27M/M	West JEC
		Reservoir Evaluation	2018/3/10 ~ 202	18/3/24	15days	0.50M/M	
			2018/4/15 ~ 202	018/4/22	8days	0.27M/M	
			2018/8/18 ~ 202	018/8/26	9days	0.30M/M	
			2019/6/8 ~ 201	19/6/16	9days	0.30M/M	
Hiroo	YOSHIYAMA	Well Siting	2017/2/4 20.	18/3/24	15days	0.55M/M	West IFC
		Wen String	2019/6/8 ~ 201)19/6/17	10days	0.33M/M	Westslee
			2016/4/27 ~ 202	016/4/30	4days	0.13M/M	
			2016/5/2 ~ 20	016/5/7	6days	0.20M/M	
			2016/5/9 ~ 202	016/5/10	2days	0.07M/M	
			2016/5/26 ~ 20.	016/5/28	3days 3days	0.10M/M	
			2016/6/7 ~ 20	016/6/9	3days	0.10M/M	
			2016/6/15 ~ 202	016/6/18	4days	0.13M/M	
			2016/6/21 ~ 202	016/6/22	2days	0.07M/M	
			2016/7/12 ~ 20:	016/7/16	5days	0.16M/M	
			$2016/7/18 \sim 202$ $2016/8/1 \sim 202$	016/7/20	3days 5days	0.10M/M	
			2016/8/22 ~ 202	016/8/27	6days	0.20M/M	
			2016/8/29 ~ 202	016/8/31	3days	0.10M/M	
			2016/9/8 ~ 201	016/9/10	3days	0.10M/M	
			2016/9/12 ~ 20:	016/9/17	6days	0.20M/M	
			$2016/10/10 \sim 201$	16/10/14	5days 2days	0.17M/M	
			2016/10/25 201 2016/11/14 ~ 201	16/11/18	5days	0.10M/M	
			2016/12/5 ~ 201	016/12/7	3days	0.10M/M	
			2016/12/8 ~ 202	016/12/9	2days	0.07M/M	
			2016/12/12 ~ 201	16/12/16	5days	0.17M/M	
			2017/1/9 ~ 202	017/1/13	5days	0.17M/M	
καριτικί	Lahan	Local Project	$2017/1/23 \sim 20.$ $2017/1/30 \sim 20.$	17/1/2/	2 days	0.17101/101	GSI
	Laban	Coordinator A	2017/2/6 ~ 20	017/2/9	4days	0.13M/M	GSE
			2017/2/11 ~ 202)17/2/18	8days	0.27M/M	
			2017/2/21 ~ 202	17/2/22	2days	0.07M/M	
			2017/3/6 ~ 202	017/3/10	5days	0.17M/M	
			$201//3/22 \sim 202$	017/3/24	3days 2days	0.10M/M	
			2017/4/3 20 2017/5/17 ~ 20	017/4/5	4days	0.10M/M	
			2017/9/18 ~ 202	17/9/22	5days	0.17M/M	
			2017/9/26 ~ 202	17/9/29	4days	0.13M/M	
			2017/12/4 ~ 202	17/12/7	4days	0.13M/M	
			2018/1/10 ~ 201	18/1/13	4days	0.13M/M	
			2018/3/7 ~ 20	018/3/8	2davs	0.17IVI/IVI 0.07M/M	
			2018/3/13 ~ 201	018/3/17	5days	0.17M/M	
			2018/3/27 ~ 202	018/3/27	1days	0.03M/M	
			2018/4/27 ~ 202	018/4/28	2days	0.07M/M	
			2018/5/9 ~ 201	018/5/10	2days	0.07M/M	
			$2018/5/14 \sim 2010$	18/5/16	3days	0.10M/M	
			2018/5/30 ~ 20	18/5/31	2days	0.07M/M	
			2018/6/1 ~ 20	018/6/1	1days	0.03M/M	
			2018/6/4 ~ 20	018/6/7	4days	0.13M/M	
			2018/6/9 ~ 202	018/6/13	5days	0.17M/M	

			2018/6/16	~	2018/6/20	5days	0.17M/M	
			2018/6/26	~	2018/6/28	3days	0.10M/M	
			2018/7/4	~	2018/7/18	2days	0.10M/M	
			2018/7/29	~	2018/7/29	1days	0.03M/M	
			2018/8/1	~	2018/8/4	4days	0.13M/M	
			2018/8/20	~	2018/8/25	6days	0.20M/M	
			2018/10/23	~	2018/10/25	3days	0.10M/M	
			2019/4/11	~	2019/4/12	2days	0.07M/M	
Takayuki		Training Coordinator B	2019/6/10	~	2019/6/11	2days	0.07M/M	West IECc
Shoma	SASAKI	Drilling Planning B	2018/7/14	~	2010/7/30	30days	1.00M/M	West JEC
Llirovulci		Equipment	2016/5/28	~	2016/6/4	8days	0.27M/M	
пігоуцкі	ISHIGAN	Procurement	2018/6/7	~	2018/6/15	9days	0.30M/M	JICS
			2017/2/12	2	2017/2/19	8days	0.27M/M	
			2017/9/23	~	2017/9/30	8days	0.27M/M	
Yoshio	SOEDA	Geologist A	2018/3/10	~	2018/3/24	15days	0.50M/M	West JEC
			2018/8/18	~	2018/8/20	11 days	0.30M/M	
			2019/6/2	~	2019/6/17	16days	0.53M/M	
Hiroo		Coologist P	2016/7/23	~	2016/8/6	15days	0.50M/M	M/+ IFC
пію	TUSHITAMA	Geologist B	2016/11/12	~	2016/11/26	15days	0.50M/M	west JEC
Yuki	FUJII	Geologist C	2019/2/3	~	2019/2/13	11days	0.37M/M	West JEC
			2016/7/23	~	2016/8/6	15days	0.50M/M	
			2016/11/12	~	2016/11/26	15days 8days	0.50M/M	
			2017/2/12	~	2017/2/19	8days	0.27M/M	•
Којі	MATSUDA	Geochemist A	2017/9/23	~	2017/9/30	8days	0.27M/M	West JEC
			2018/3/10	~	2018/3/24	15days	0.50M/M	
			2018/8/18	~	2018/8/26	9days	0.30M/M	
			2019/6/2	~	2019/6/17	16days	0.53M/M	
			2017/1/7	~	2017/1/22	16days	0.53M/M	
Tatsuto	INO	Goochomist C	2017/5/13	~	2017/5/27	15days	0.50M/M	LOVE EARTH
Taisulo	INC	Geochemist C	2018/1/20	~	2018/2/4	16days	0.53M/M	21CO., INC
			2019/5/5	~	2019/5/18	14days	0.47M/M	
			2016/7/23	~	2016/8/6	15days	0.50M/M	
			2017/2/12	2	2017/2/19	8days	0.27M/M	
Mitsuru	HONDA	Geophysicist A	2017/9/23	~	2017/9/30	8days	0.27M/M	West IFC
		Coopingolocort	2018/3/10	~	2018/3/24	15days	0.50M/M	
			2018/8/18	~	2018/8/26	9days	0.30M/M	
			2019/0/2	~	2019/0/17	9days	0.33M/M	
Toshiyuki	TOSHA	Geophysicist B	2019/2/23	~	2019/3/3	9days	0.30M/M	KUMAMOTO
•			2019/6/2	~	2019/6/16	15days	0.50M/M	UNIVERSITY
			2016/7/23	2	2016/8/6	15days	0.50M/M	
Hiroki	SAITO	Geophysicist C	2017/9/23	~	2017/9/30	8days	0.27M/M	West JEC
			2018/8/18	~	2018/8/26	9days	0.30M/M	
			2019/6/2	~	2019/6/17	16days	0.53M/M	
		Data Integration/Data	2010/11/12	~	2010/11/20	16days	0.53M/M	
Tomohiro	TAKAZONO	management	2018/3/10	~	2018/3/24	15days	0.50M/M	TROPS Co.,Ltd.
			2018/8/18	~	2018/9/2	16days	0.53M/M	
			2017/2/4	~	2017/2/18	15days	0.50M/M	
		Wallborg	2017/9/23	~	2017/9/30	8days	0.27M/M	4
Hidaki		Survey/Discharge	2018/3/10	~	2018/3/24	15days	0.50M/M	
niueki	TA LANAKA	Testing/Reservoir	2018/8/18	~	2018/8/26	9days	0.30M/M	West JEC
		would	2019/3/12		2019/3/22	11davs	0.23W/M	1
			2019/6/2	~	2019/6/17	16days	0.53M/M	1
Masahiko	KANEKO	Economic Evoluction	2018/1/21	~	2018/2/4	15days	0.50M/M	Most IFC
	NANERU		2019/5/13	~	2019/5/26	14days	0.47M/M	west JEC
			2016/5/5	~	2016/6/23	50days	1.67M/M	
Vula	Lime learning	Vieual training material	2016/8/8	~	2016/9/1	25days	0.83M/M	
YUKI	Lima Isomura	visual training material	2018/3/10	~	2018/3/24	15days	0.50M/M	West JEC
			2018/8/18	~	2018/9/16	27 uays 30 days	1.00M/M	1
Akira	KOMATSU	Drilling Advisor A	2016/5/28	~	2016/6/23	27days	0.90M/M	SKE
Masashi	IWAYA	Drilling Advisor A	2018/6/24	~	2018/7/20	27days	0.90M/M	SKE
Teruaki	ΚΟΒΑΥΔSHI	Drilling Advisor C	2018/6/2	~	2018/6/29	28days	0.93M/M	BETS Co
	KO BATASHI		2018/9/3	~	2018/10/28	56days	1.87M/M	DE 13 CO.
Winston D	CASTILLO	Drilling Advisor D	2018/7/24	~	2018/8/8	14days	0.47M/M	The Di
winston R.	CASTILLO	Drilling Advisor D	2018/8/25	~	2018/9/2	/days	0.23M/M	i nermaPrime.
			2016/5/1	~	2018/10/7	27days	0.231/1/1/	I
Tsuyoshi	ABE	Drilling Advisor E	2016/6/25	~	2016/7/22	28davs	0.93M/M	BETS Co.
Yuji	NAKANO	Drilling Advisor F	2016/7/27	~	2016/9/18	54days	1.80M/M	NMCC.

			2016/4/30	~	2016/5/31	30days	1.00M/M	
			2016/6/25	~	2016/7/26	30days	1.00M/M	
Noel D.	CRUZ	Toolpusher A	2016/8/20	~	2016/9/18	28days	0.93M/M	ThermaPrime.
			2018/6/2	~	2018///1	28days	0.93M/M	
			2018/9/23	~	2018/3/23	33davs	1.10M/M	
			2016/4/30	~	2016/5/31	30days	1.00M/M	
			2016/6/25	~	2016/7/26	30days	1.00M/M	
Romeo S	GENIS	Maintenance	2016/8/20	~	2016/9/18	28days	0.93M/M	ThermaPrime
Nomeo 5.	GEINIS	Supervisor A	2018/6/2	~	2018/7/1	28days	0.93M/M	mermarnine.
			2018/7/24	~	2018/8/25	31days	1.03M/M	
			2018/9/23	~	2018/10/27	33days	1.10M/M	
			2016/6/25	~	2016/3/31	30days	1.00M/M	
	0.0404.5	Senior Drilling Engineer	2016/8/20	~	2016/9/18	28days	0.93M/M	
iviichael Ryan	C. BARILE	A	2018/6/2	~	2018/7/1	28days	0.93M/M	ThermaPrime.
			2018/7/24	~	2018/8/25	31days	1.03M/M	
			2018/9/23	~	2018/10/27	33days	1.10M/M	
			2016/5/28	~	2016/6/28	30days	1.00M/M	
Mamerto B.	SUASIN Jr.	Toolpusher B	2016/7/23	~	2016/8/23	30days	1.00M/M	ThermaPrime.
			2018/8/28	~	2018/7/27	280ays 34days	0.931VI/IVI 1.13M/M	
Alfonco C		Maintenance	2010/0/22	~	2010/5/20	0 days	0.0784/84	The survey During a
Alloliso G.	DAENA JI.	Supervisor B	2016/5/28		2016/6/5	8days	0.27101/101	Thermaprime.
		Maintanana	2016/6/15	~	2016/6/28	13days	0.43M/M	
Randy. S.	DAY	Supervisor B	2010/7/23	~	2010/8/23	28days	0.93M/M	ThermaPrime.
			2018/8/22	~	2018/9/26	34davs	1.13M/M	
Corre	CANETE	Senior Drilling Engineer	2016/5/28	~	2016/6/28	30days	1.00M/M	
Garry F.	CANETE	В	2016/7/23	~	2016/8/23	30days	1.00M/M	ThermaPrime.
Graciano Emmanuelito E	DELA CRUZ	Senior Drilling Engineer	2018/6/28	~	2018/7/27	28days	0.93M/M	ThermaPrime.
Conrado Ir		Senior Drilling Engineer	2018/8/22	~	2018/0/26	24days	1 1204/04	ThermaBrime
		В	2010/0/22		2010/9/20	34uays	1.13101/101	mermarnne.
Voshitaka	ιςμικαννα	Mud Engineer	2016/8/29	~	2016/9/4	/days	0.231V1/1V1	Tolnito Co
rosintaka	131110/00/0	Widd Eligineei	2018/10/21	~	2018/10/29	9days	0.30M/M	Tennice co.
Edralin C.	ICABALES	Drilling Engineer	2016/7/28	~	2016/8/7	9days	0.30M/M	ThermaPrime.
Yutaka	МІКІ	Project Management B1	2016/9/10	~	2016/9/17	8days	0.27M/M	JRI
Yutaka		Project Management B1 Project Management	2016/9/10 2016/9/10	2 2	2016/9/17 2016/9/17	8days 8days	0.27M/M 0.27M/M	JRI
Yutaka Koichiro	MIKI DANNO	Project Management B1 Project Management B2	2016/9/10 2016/9/10 2016/12/10	~ ~ ~	2016/9/17 2016/9/17 2016/12/17	8days 8days 8days	0.27M/M 0.27M/M 0.27M/M	JRI JRI
Yutaka Koichiro Yoko	MIKI DANNO CHIVERS	Project Management B1 Project Management B2 Project Management C	2016/9/10 2016/9/10 2016/12/10 2016/12/10	2 2 2	2016/9/17 2016/9/17 2016/12/17 2016/12/17	8days 8days 8days 8days	0.27M/M 0.27M/M 0.27M/M 0.27M/M	JRI JRI SMBC
Yutaka Koichiro Yoko	MIKI DANNO CHIVERS	Project Management B1 Project Management B2 Project Management C Multi-purpose Use of	2016/9/10 2016/9/10 2016/12/10 2016/12/10 2016/10/8 2017/2/18	2 2 2 2 2	2016/9/17 2016/9/17 2016/12/17 2016/12/17 2016/10/15 2017/2/25	8days 8days 8days 8days 8days 8days	0.27M/M 0.27M/M 0.27M/M 0.27M/M 0.27M/M	JRI JRI SMBC
Yutaka Koichiro Yoko Norio	MIKI DANNO CHIVERS SHIGETOMI	Project Management B1 Project Management B2 Project Management C Multi-purpose Use of Geothermal Energy A	2016/9/10 2016/9/10 2016/12/10 2016/12/10 2016/10/8 2017/3/18 2017/9/16	2 2 2 2 2 2	2016/9/17 2016/9/17 2016/12/17 2016/12/17 2016/10/15 2017/3/25 2017/9/23	8days 8days 8days 8days 8days 8days 8days 8days	0.27M/M 0.27M/M 0.27M/M 0.27M/M 0.27M/M 0.27M/M	JRI JRI SMBC MRI.
Yutaka Koichiro Yoko Norio	MIKI DANNO CHIVERS SHIGETOMI	Project Management B1 Project Management B2 Project Management C Multi-purpose Use of Geothermal Energy A	2016/9/10 2016/12/10 2016/12/10 2016/12/10 2016/10/8 2017/3/18 2017/9/16 2016/10/22	2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	2016/9/17 2016/9/17 2016/12/17 2016/12/17 2016/10/15 2017/3/25 2017/9/23 2016/10/29	8days 8days 8days 8days 8days 8days 8days 8days	0.27M/M 0.27M/M 0.27M/M 0.27M/M 0.27M/M 0.27M/M 0.27M/M	JRI JRI SMBC MRI.
Yutaka Koichiro Yoko Norio Tomoaki	MIKI DANNO CHIVERS SHIGETOMI HIROSE	Project Management B1 Project Management B2 Project Management C Multi-purpose Use of Geothermal Energy A Business Administration/Finance	2016/9/10 2016/9/10 2016/12/10 2016/12/10 2016/10/8 2017/3/18 2017/9/16 2016/10/22 2017/2/25	2 2 2 2 2 2 2	2016/9/17 2016/12/17 2016/12/17 2016/10/15 2017/3/25 2017/9/23 2016/10/29 2017/3/4	8days 8days 8days 8days 8days 8days 8days 8days 8days	0.27M/M 0.27M/M 0.27M/M 0.27M/M 0.27M/M 0.27M/M 0.27M/M 0.27M/M	JRI JRI SMBC MRI. MRI.
Yutaka Koichiro Yoko Norio Tomoaki	MIKI DANNO CHIVERS SHIGETOMI HIROSE	Project Management B1 Project Management B2 Project Management C Multi-purpose Use of Geothermal Energy A Business Administration/Finance A	2016/9/10 2016/9/10 2016/12/10 2016/12/10 2016/10/8 2017/3/18 2017/9/16 2016/10/22 2017/2/25 2017/12/2		2016/9/17 2016/12/17 2016/12/17 2016/10/15 2017/3/25 2017/9/23 2016/10/29 2017/3/4 2017/12/9	8days 8days 8days 8days 8days 8days 8days 8days 8days 8days 8days	0.27M/M 0.27M/M 0.27M/M 0.27M/M 0.27M/M 0.27M/M 0.27M/M 0.27M/M 0.27M/M 0.27M/M	JRI JRI SMBC MRI. MRI.
Yutaka Koichiro Yoko Norio Tomoaki	MIKI DANNO CHIVERS SHIGETOMI HIROSE	Project Management B1 Project Management B2 Project Management C Multi-purpose Use of Geothermal Energy A Business Administration/Finance A	2016/9/10 2016/9/10 2016/12/10 2016/12/10 2016/10/8 2017/3/18 2017/9/16 2016/10/22 2017/2/25 2017/12/2 2016/9/4		2016/9/17 2016/12/17 2016/12/17 2016/10/15 2017/3/25 2017/9/23 2016/10/29 2017/3/4 2017/12/9 2016/9/17	8days 8days 8days 8days 8days 8days 8days 8days 8days 8days 14days	0.27M/M 0.27M/M 0.27M/M 0.27M/M 0.27M/M 0.27M/M 0.27M/M 0.27M/M 0.27M/M 0.27M/M 0.27M/M	JRI JRI SMBC MRI. MRI.
Yutaka Koichiro Yoko Norio Tomoaki Masako	MIKI DANNO CHIVERS SHIGETOMI HIROSE TERAMOTO	Project Management B1 Project Management B2 Project Management C Multi-purpose Use of Geothermal Energy A Business Administration/Finance A	2016/9/10 2016/9/10 2016/12/10 2016/12/10 2016/10/8 2017/3/18 2017/9/16 2016/10/22 2017/2/25 2017/12/2 2016/9/4 2016/11/20		2016/9/17 2016/12/17 2016/12/17 2016/12/17 2016/10/15 2017/3/25 2017/9/23 2016/10/29 2017/3/4 2017/12/9 2016/9/17 2016/12/9	8days 8days 8days 8days 8days 8days 8days 8days 8days 8days 14days 20days	0.27M/M 0.27M/M 0.27M/M 0.27M/M 0.27M/M 0.27M/M 0.27M/M 0.27M/M 0.27M/M 0.27M/M 0.27M/M 0.47M/M 0.67M/M	JRI JRI SMBC MRI. MRI.
Yutaka Koichiro Yoko Norio Tomoaki Masako	MIKI DANNO CHIVERS SHIGETOMI HIROSE TERAMOTO	Project Management B1 Project Management B2 Project Management C Multi-purpose Use of Geothermal Energy A Business Administration/Finance A Environmental and Social Safeguard A	2016/9/10 2016/9/10 2016/12/10 2016/12/10 2016/10/8 2017/3/18 2017/9/16 2016/10/22 2017/2/25 2017/2/25 2017/12/2 2016/9/4 2016/11/20 2017/4/16		2016/9/17 2016/12/17 2016/12/17 2016/10/15 2017/3/25 2017/9/23 2016/10/29 2017/3/4 2017/12/9 2016/9/17 2016/12/9 2017/4/27 2019/4/20	8days 8days 8days 8days 8days 8days 8days 8days 8days 14days 20days 12days	0.27M/M 0.27M/M 0.27M/M 0.27M/M 0.27M/M 0.27M/M 0.27M/M 0.27M/M 0.27M/M 0.27M/M 0.27M/M 0.47M/M 0.67M/M 0.40M/M	JRI JRI SMBC MRI. MRI. Nippon Koei Co., Ltd.
Yutaka Koichiro Yoko Norio Tomoaki Masako	MIKI DANNO CHIVERS SHIGETOMI HIROSE TERAMOTO	Project Management B1 Project Management B2 Project Management C Multi-purpose Use of Geothermal Energy A Business Administration/Finance A Environmental and Social Safeguard A	2016/9/10 2016/9/10 2016/12/10 2016/12/10 2016/10/8 2017/3/18 2017/9/16 2016/10/22 2017/2/25 2017/12/2 2016/9/4 2016/11/20 2017/4/16 2018/1/14 2016/9/10		2016/9/17 2016/12/17 2016/12/17 2016/10/15 2017/3/25 2017/3/25 2016/10/29 2017/3/4 2017/12/9 2016/9/17 2016/12/9 2017/4/27 2018/1/20 2016/9/24	8days 8days 8days 8days 8days 8days 8days 8days 8days 14days 20days 12days 15days	0.27M/M 0.27M/M 0.27M/M 0.27M/M 0.27M/M 0.27M/M 0.27M/M 0.27M/M 0.27M/M 0.27M/M 0.27M/M 0.47M/M 0.67M/M 0.40M/M 0.23M/M 0.23M/M	JRI JRI SMBC MRI. MRI. Nippon Koei Co., Ltd.
Yutaka Koichiro Yoko Norio Tomoaki Masako	MIKI DANNO CHIVERS SHIGETOMI HIROSE TERAMOTO	Project Management B1 Project Management B2 Project Management C Multi-purpose Use of Geothermal Energy A Business Administration/Finance A Environmental and Social Safeguard A	2016/9/10 2016/12/10 2016/12/10 2016/12/10 2016/10/8 2017/3/18 2017/9/16 2016/10/22 2017/2/25 2017/12/2 2016/9/4 2016/11/20 2017/4/16 2018/1/14 2016/9/10 2016/11/19		2016/9/17 2016/12/17 2016/12/17 2016/10/15 2017/3/25 2017/9/23 2016/10/29 2017/3/4 2017/12/9 2016/9/17 2016/12/9 2017/4/27 2018/1/20 2016/9/24 2016/11/27	8days 8days 8days 8days 8days 8days 8days 8days 8days 14days 20days 12days 7days 15days 9days	0.27M/M 0.27M/M 0.27M/M 0.27M/M 0.27M/M 0.27M/M 0.27M/M 0.27M/M 0.27M/M 0.27M/M 0.47M/M 0.67M/M 0.40M/M 0.23M/M 0.50M/M 0.30M/M	JRI JRI SMBC MRI. MRI. Nippon Koei Co., Ltd.
Yutaka Koichiro Yoko Norio Tomoaki Masako Shatei	MIKI DANNO CHIVERS SHIGETOMI HIROSE TERAMOTO	Project Management B1 Project Management B2 Project Management C Multi-purpose Use of Geothermal Energy A Business Administration/Finance A Environmental and Social Safeguard B	2016/9/10 2016/12/10 2016/12/10 2016/12/10 2016/10/8 2017/3/18 2017/9/16 2016/10/22 2017/2/25 2017/12/2 2016/9/4 2016/11/20 2017/4/16 2018/1/14 2016/9/10 2017/1/21		2016/9/17 2016/12/17 2016/12/17 2016/10/15 2017/3/25 2017/9/23 2016/10/29 2017/3/4 2017/12/9 2016/9/17 2016/12/9 2017/4/27 2018/1/20 2016/9/24 2016/11/27 2017/1/29	8days 8days 8days 8days 8days 8days 8days 8days 8days 14days 12days 7days 15days 9days	0.27M/M 0.27M/M 0.27M/M 0.27M/M 0.27M/M 0.27M/M 0.27M/M 0.27M/M 0.27M/M 0.27M/M 0.27M/M 0.47M/M 0.67M/M 0.40M/M 0.23M/M 0.30M/M 0.30M/M	JRI JRI SMBC MRI. MRI. Nippon Koei Co., Ltd. West JEC
Yutaka Koichiro Yoko Norio Tomoaki Masako Shatei	MIKI DANNO CHIVERS SHIGETOMI HIROSE TERAMOTO	Project Management B1 Project Management B2 Project Management C Multi-purpose Use of Geothermal Energy A Business Administration/Finance A Environmental and Social Safeguard A Environmental and Social Safeguard B	2016/9/10 2016/12/10 2016/12/10 2016/12/10 2016/10/8 2017/3/18 2017/9/16 2016/10/22 2017/2/25 2017/12/2 2016/9/4 2016/11/20 2017/4/16 2018/1/14 2016/9/10 2017/1/21 2018/1/7		2016/9/17 2016/12/17 2016/12/17 2016/10/15 2017/3/25 2017/9/23 2016/10/29 2017/3/4 2017/12/9 2016/9/17 2016/12/9 2017/4/27 2018/1/20 2016/9/24 2016/11/27 2018/1/20	8days 8days 8days 8days 8days 8days 8days 8days 8days 14days 12days 12days 7days 15days 9days 9days 14days	0.27M/M 0.27M/M 0.27M/M 0.27M/M 0.27M/M 0.27M/M 0.27M/M 0.27M/M 0.27M/M 0.27M/M 0.47M/M 0.47M/M 0.50M/M 0.30M/M 0.30M/M 0.47M/M	JRI JRI SMBC MRI. MRI. Nippon Koei Co., Ltd. West JEC
Yutaka Koichiro Yoko Norio Tomoaki Masako Shatei	MIKI DANNO CHIVERS SHIGETOMI HIROSE TERAMOTO	Project Management B1 Project Management B2 Project Management C Multi-purpose Use of Geothermal Energy A Business Administration/Finance A Environmental and Social Safeguard A Environmental and	2016/9/10 2016/12/10 2016/12/10 2016/12/10 2016/10/8 2017/3/18 2017/9/16 2016/10/22 2017/2/25 2017/2/25 2017/12/2 2016/9/4 2016/11/20 2017/4/16 2018/1/14 2016/9/10 2017/1/21 2018/1/7 2018/4/8		2016/9/17 2016/12/17 2016/12/17 2016/10/15 2017/3/25 2017/9/23 2016/10/29 2017/3/4 2017/12/9 2016/9/17 2016/12/9 2017/4/27 2018/1/20 2016/9/24 2016/11/27 2018/1/20 2018/1/20 2018/4/14	8days8days8days8days8days8days8days8days8days8days8days20days12days7days15days9days9days14days7days	0.27M/M 0.27M/M 0.27M/M 0.27M/M 0.27M/M 0.27M/M 0.27M/M 0.27M/M 0.27M/M 0.27M/M 0.27M/M 0.47M/M 0.47M/M 0.30M/M 0.30M/M 0.30M/M 0.30M/M 0.23M/M	JRI JRI SMBC MRI. MRI. Nippon Koei Co., Ltd. West JEC
Yutaka Koichiro Yoko Norio Tomoaki Masako Shatei	MIKI DANNO CHIVERS SHIGETOMI HIROSE TERAMOTO IRI	Project Management B1 Project Management B2 Project Management C Multi-purpose Use of Geothermal Energy A Business Administration/Finance A Environmental and Social Safeguard A Environmental and	2016/9/10 2016/12/10 2016/12/10 2016/12/10 2016/10/8 2017/3/18 2017/9/16 2016/10/22 2017/2/25 2017/2/25 2017/12/2 2016/9/4 2016/11/20 2017/4/16 2018/1/14 2016/9/10 2016/11/19 2017/1/21 2018/1/7 2018/4/8 2016/4/23		2016/9/17 2016/12/17 2016/12/17 2016/10/15 2017/3/25 2017/3/25 2017/9/23 2016/10/29 2017/3/4 2017/12/9 2016/9/17 2016/12/9 2016/12/9 2016/11/27 2018/1/20 2016/9/24 2016/11/27 2018/1/20 2018/4/14 2016/4/29	8days 8days 8days 8days 8days 8days 8days 8days 8days 14days 12days 12days 12days 12days 15days 9days 9days 14days 7days	0.27M/M 0.27M/M 0.27M/M 0.27M/M 0.27M/M 0.27M/M 0.27M/M 0.27M/M 0.27M/M 0.27M/M 0.27M/M 0.27M/M 0.47M/M 0.40M/M 0.30M/M 0.30M/M 0.30M/M 0.30M/M 0.23M/M 0.23M/M 0.23M/M	JRI JRI MRI. MRI. Nippon Koei Co., Ltd. West JEC
Yutaka Koichiro Yoko Norio Tomoaki Masako Shatei	MIKI DANNO CHIVERS SHIGETOMI HIROSE TERAMOTO	Project Management B1 Project Management B2 Project Management C Multi-purpose Use of Geothermal Energy A Business Administration/Finance A Environmental and Social Safeguard A Environmental and Social Safeguard B	2016/9/10 2016/12/10 2016/12/10 2016/12/10 2016/10/8 2017/3/18 2017/9/16 2016/10/22 2017/2/25 2017/2/25 2017/12/2 2016/9/4 2016/11/20 2017/4/16 2018/1/14 2016/9/10 2016/11/19 2017/1/21 2018/4/8 2016/4/23 2016/4/23		2016/9/17 2016/12/17 2016/12/17 2016/12/17 2016/10/15 2017/3/25 2017/3/25 2017/3/4 2017/12/9 2016/10/29 2017/4/27 2016/12/9 2016/12/9 2016/12/7 2018/1/20 2018/1/20 2018/4/14 2016/4/29 2016/12/10	8days 8days 8days 8days 8days 8days 8days 8days 8days 8days 14days 12days 12days 12days 12days 12days 9days 9days 14days 7days 14days 7days 8days	0.27M/M 0.27M/M 0.27M/M 0.27M/M 0.27M/M 0.27M/M 0.27M/M 0.27M/M 0.27M/M 0.27M/M 0.27M/M 0.27M/M 0.40M/M 0.30M/M 0.30M/M 0.30M/M 0.30M/M 0.23M/M 0.23M/M 0.23M/M 0.23M/M 0.23M/M	JRI JRI SMBC MRI. MRI. Nippon Koei Co., Ltd. West JEC
Yutaka Koichiro Yoko Norio Tomoaki Masako Shatei Takeshi	MIKI DANNO CHIVERS SHIGETOMI HIROSE TERAMOTO IRI	Project Management B1 Project Management B2 Project Management C Multi-purpose Use of Geothermal Energy A Business Administration/Finance A Environmental and Social Safeguard A Environmental and Social Safeguard B Power Plant Engineering A	2016/9/10 2016/12/10 2016/12/10 2016/12/10 2016/10/8 2017/3/18 2017/9/16 2016/10/22 2017/2/25 2017/2/25 2017/12/2 2016/9/4 2016/11/20 2017/4/16 2018/1/7 2018/1/7 2018/4/8 2016/4/23 2016/11/27		2016/9/17 2016/12/17 2016/12/17 2016/10/15 2017/3/25 2017/3/25 2017/3/4 2017/12/9 2016/10/29 2017/3/4 2016/12/9 2016/12/9 2016/12/9 2016/12/7 2018/1/20 2018/1/20 2018/4/14 2016/4/29 2016/12/10	8days8days8days8days8days8days8days8days8days8days8days8days8days9days12days7days14days9days9days14days7days14days7days14days7days14days7days14days14days15days15days	0.27M/M 0.27M/M 0.27M/M 0.27M/M 0.27M/M 0.27M/M 0.27M/M 0.27M/M 0.27M/M 0.27M/M 0.27M/M 0.47M/M 0.40M/M 0.30M/M 0.30M/M 0.30M/M 0.30M/M 0.23M/M 0.23M/M 0.23M/M 0.23M/M 0.23M/M 0.23M/M 0.23M/M 0.23M/M 0.23M/M 0.23M/M 0.27M/M 0.27M/M 0.27M/M	JRI JRI SMBC MRI. MRI. Nippon Koei Co., Ltd. West JEC
Yutaka Koichiro Yoko Norio Tomoaki Masako Shatei Takeshi	MIKI DANNO CHIVERS SHIGETOMI HIROSE TERAMOTO IRI YAMAMOTO	Project Management B1 Project Management B2 Project Management C Multi-purpose Use of Geothermal Energy A Business Administration/Finance A Environmental and Social Safeguard A Environmental and Social Safeguard B Power Plant Engineering A	2016/9/10 2016/12/10 2016/12/10 2016/12/10 2016/10/8 2017/3/18 2017/9/16 2016/10/22 2017/2/25 2017/2/25 2017/12/2 2016/9/4 2016/11/20 2017/4/16 2018/1/14 2016/9/10 2017/1/21 2018/1/7 2018/4/8 2016/4/23 2016/11/27 2017/3/4 2018/1/27 2018/1/27		2016/9/17 2016/12/17 2016/12/17 2016/10/15 2017/3/25 2017/3/25 2017/3/25 2016/10/29 2017/3/4 2016/10/29 2016/9/17 2016/12/9 2016/12/9 2016/11/27 2016/11/27 2018/1/20 2018/1/20 2018/4/14 2016/4/29 2016/12/10 2017/3/11 2018/2/10 2018/5/26	8days8days8days8days8days8days8days8days8days8days8days12days12days12days9days9days14days7days14days7days14days7days14days7days14days7days14days14days15days15days15days	0.27M/M 0.27M/M 0.27M/M 0.27M/M 0.27M/M 0.27M/M 0.27M/M 0.27M/M 0.27M/M 0.27M/M 0.27M/M 0.47M/M 0.40M/M 0.30M/M 0.30M/M 0.30M/M 0.23M/M 0.30M/M 0.23M/M 0.30M/M 0.23M/M 0.30M/M 0.30M/M 0.30M/M 0.30M/M 0.30M/M 0.23M/M 0.30M/M 0.30M/M 0.30M/M 0.30M/M 0.33M/	JRI JRI SMBC MRI. MRI. Nippon Koei Co., Ltd. West JEC West JEC
Yutaka Koichiro Yoko Norio Tomoaki Masako Shatei Takeshi Tatsunari	MIKI DANNO CHIVERS SHIGETOMI HIROSE TERAMOTO IRI YAMAMOTO HAYASHI	Project Management B1 Project Management B2 Project Management C Multi-purpose Use of Geothermal Energy A Business Administration/Finance A Environmental and Social Safeguard A Environmental and Social Safeguard B Power Plant Engineering A	2016/9/10 2016/12/10 2016/12/10 2016/12/10 2016/10/8 2017/3/18 2017/3/18 2017/3/18 2017/2/25 2017/2/25 2017/2/25 2017/2/25 2017/2/25 2017/2/25 2017/12/2 2016/9/4 2016/11/20 2016/11/27 2018/4/8 2016/4/23 2016/11/27 2018/5/12 2016/11/27		2016/9/17 2016/12/17 2016/12/17 2016/12/17 2016/10/15 2017/3/25 2017/3/25 2017/3/4 2016/10/29 2017/3/4 2016/12/9 2016/9/17 2016/12/9 2016/11/27 2016/11/27 2016/11/27 2016/11/27 2016/12/10 2018/4/14 2016/4/29 2016/12/10	8days8days8days8days8days8days8days8days8days8days20days12days7days15days9days14days7days14days7days14days8days14days9days14days7days14days8days15days15days15days15days14days8days15days15days15days	0.27M/M 0.27M/M 0.27M/M 0.27M/M 0.27M/M 0.27M/M 0.27M/M 0.27M/M 0.27M/M 0.27M/M 0.27M/M 0.27M/M 0.47M/M 0.40M/M 0.30M/M 0.30M/M 0.30M/M 0.23M/M 0.23M/M 0.23M/M 0.23M/M 0.23M/M 0.23M/M 0.23M/M 0.23M/M 0.23M/M 0.27M/M 0.27M/M 0.27M/M	JRI JRI SMBC MRI. MRI. Nippon Koei Co., Ltd. West JEC West JEC
Yutaka Koichiro Yoko Norio Tomoaki Masako Shatei Takeshi Tatsunari	MIKI DANNO CHIVERS SHIGETOMI HIROSE TERAMOTO IRI YAMAMOTO HAYASHI	Project Management B1 Project Management B2 Project Management C Multi-purpose Use of Geothermal Energy A Business Administration/Finance A Environmental and Social Safeguard A Environmental and Social Safeguard B Power Plant Engineering A Power Plant Engineering B	2016/9/10 2016/12/10 2016/12/10 2016/12/10 2016/10/8 2017/3/18 2017/3/18 2017/3/18 2017/3/18 2016/10/22 2017/2/25 2017/2/25 2017/12/2 2016/9/4 2016/11/20 2016/11/20 2016/11/21 2018/1/7 2018/1/7 2018/1/7 2018/1/27 2017/3/4 2016/11/27 2016/11/27		2016/9/17 2016/12/17 2016/12/17 2016/10/15 2017/3/25 2017/3/25 2017/3/4 2016/10/29 2017/3/4 2016/12/9 2016/9/17 2016/12/9 2016/11/27 2016/11/27 2016/11/27 2016/11/27 2016/12/10 2018/4/14 2016/4/29 2016/12/10 2018/5/26 2016/12/10	8days8days8days8days8days8days8days8days8days8days8days8days14days20days15days9days9days14days7days7days14days8days14days14days14days15days15days15days15days15days15days15days15days14days14days14days14days14days14days	0.27M/M 0.27M/M 0.27M/M 0.27M/M 0.27M/M 0.27M/M 0.27M/M 0.27M/M 0.27M/M 0.27M/M 0.27M/M 0.27M/M 0.47M/M 0.40M/M 0.30M/M 0.30M/M 0.23M/M 0.23M/M 0.23M/M 0.23M/M 0.23M/M 0.23M/M 0.23M/M 0.23M/M 0.27M/M 0.2	JRI JRI SMBC MRI. MRI. Nippon Koei Co., Ltd. West JEC West JEC
Yutaka Koichiro Yoko Norio Tomoaki Masako Shatei Takeshi Takeshi	MIKI DANNO CHIVERS SHIGETOMI HIROSE TERAMOTO IRI YAMAMOTO HAYASHI MATCHO	Project Management B1 Project Management B2 Project Management C Multi-purpose Use of Geothermal Energy A Business Administration/Finance A Environmental and Social Safeguard A Environmental and Social Safeguard B Power Plant Engineering A Power Plant Engineering B Power Plant	2016/9/10 2016/12/10 2016/12/10 2016/12/10 2016/12/10 2016/10/8 2017/3/18 2017/3/18 2017/3/18 2016/10/22 2017/2/25 2017/2/25 2017/12/2 2016/11/20 2016/11/19 2016/11/19 2016/11/27 2018/1/7 2018/1/7 2018/1/27 2017/3/4 2016/11/27 2016/11/27 2016/11/27 2016/11/27 2016/11/27		2016/9/17 2016/12/17 2016/12/17 2016/10/15 2017/325 2017/9/23 2016/10/29 2017/3/4 2017/12/9 2016/9/17 2016/12/9 2016/11/27 2016/11/27 2016/11/27 2018/1/20 2016/11/27 2018/1/20 2018/4/14 2016/4/29 2016/12/10 2018/5/26 2016/12/10 2016/12/10 2017/3/11	8days8days8days8days8days8days8days8days8days8days8days20days14days20days15days9days14days9days14days7days7days14days15days14days14days15days15days14days15days15days15days15days15days14days14days14days14days14days14days7days	0.27M/M 0.27M/M 0.27M/M 0.27M/M 0.27M/M 0.27M/M 0.27M/M 0.27M/M 0.27M/M 0.27M/M 0.27M/M 0.27M/M 0.47M/M 0.30M/M 0.30M/M 0.30M/M 0.23M/M 0.23M/M 0.23M/M 0.23M/M 0.23M/M 0.23M/M 0.23M/M 0.23M/M 0.23M/M 0.23M/M 0.23M/M 0.23M/M 0.23M/M 0.23M/M	JRI JRI SMBC MRI. MRI. Nippon Koei Co., Ltd. West JEC West JEC
Yutaka Koichiro Yoko Norio Tomoaki Masako Shatei Shatei Takeshi Tatsunari Teruaki	MIKI DANNO CHIVERS SHIGETOMI HIROSE TERAMOTO IRI YAMAMOTO HAYASHI MATSUO	Project Management B1 Project Management B2 Project Management C Multi-purpose Use of Geothermal Energy A Business Administration/Finance A Environmental and Social Safeguard A Environmental and Social Safeguard B Power Plant Engineering A Power Plant Engineering B Power Plant Engineering C	2016/9/10 2016/12/10 2016/12/10 2016/12/10 2016/12/10 2016/10/8 2017/3/18 2017/3/18 2017/3/18 2017/3/18 2016/10/22 2017/2/25 2017/2/25 2017/12/2 2016/9/4 2016/9/4 2016/11/20 2016/11/19 2016/11/27 2018/1/27 2018/5/12 2016/11/27 2016/11/27 2016/11/27 2016/11/27 2016/11/27		2016/9/17 2016/12/17 2016/12/17 2016/10/15 2017/3/25 2017/9/23 2016/10/29 2017/3/4 2017/12/9 2016/9/17 2016/12/9 2016/12/9 2016/11/27 2016/11/27 2016/11/27 2016/11/29 2018/1/20 2018/1/20 2016/12/10 2017/3/11 2018/2/10 2016/12/10	8days8days8days8days8days8days8days8days8days8days8days8days14days20days12days9days15days9days14days7days7days15days15days14days15days15days15days15days15days15days14days14days14days14days14days14days14days14days14days15days15days15days15days15days15days15days15days15days	0.27M/M 0.27M/M 0.27M/M 0.27M/M 0.27M/M 0.27M/M 0.27M/M 0.27M/M 0.27M/M 0.27M/M 0.27M/M 0.27M/M 0.47M/M 0.30M/M 0.30M/M 0.23M/M 0.25M/M 0.23M/M 0.23M/M 0.25M/M 0.23M/M 0.23M/M 0.25M/M 0.23M/M 0.25M/M 0.25M/M 0.23M/M 0.25M/M 0.25M/M 0.25M/M 0.23M/M 0.25M/M 0.25M/M 0.23M/M 0.23M/M 0.25M/M 0.23M/M 0.23M/M 0.25M/M 0.50M/M 0.25M/M 0.50M/M 0.25M/M 0.25M/M 0.50M/M 0.25M/M 0.25M/M 0.50M/M 0.25M/M 0.25M/M 0.50M/M 0.25M/M 0.25M/M 0.25M/M 0.50M/M 0.25M/M 0.55M/M 0.5	JRI JRI SMBC MRI. MRI. Nippon Koei Co., Ltd. West JEC West JEC West JEC
Yutaka Koichiro Yoko Norio Tomoaki Masako Shatei Takeshi Tatsunari Teruaki	MIKI DANNO CHIVERS SHIGETOMI HIROSE TERAMOTO IRI YAMAMOTO HAYASHI MATSUO	Project Management B1 Project Management B2 Project Management C Multi-purpose Use of Geothermal Energy A Business Administration/Finance A Environmental and Social Safeguard A Environmental and Social Safeguard B Power Plant Engineering A Power Plant Engineering B Power Plant Engineering C	2016/9/10 2016/12/10 2016/12/10 2016/12/10 2016/12/10 2016/10/8 2017/3/18 2017/3/18 2017/9/16 2016/10/22 2017/2/25 2017/2/25 2017/12/2 2016/9/4 2016/11/20 2017/4/16 2018/1/7 2018/1/7 2018/1/7 2018/4/8 2016/4/23 2016/11/27 2018/5/12 2016/11/27 2018/5/12 2018/1/27 2018/5/12		2016/9/17 2016/12/17 2016/12/17 2016/10/15 2017/3/25 2017/3/25 2017/3/29 2016/10/29 2017/3/4 2016/12/9 2016/9/17 2016/12/9 2016/12/9 2016/12/9 2016/11/27 2018/1/20 2018/1/20 2016/12/10 2016/12/10 2018/5/26 2016/12/10 2017/3/11 2018/2/10 2018/2/10	8days 9days 12days 9days 9days 14days 7days 14days 8days 15days 15days 14days 7days 15days 14days 14days 14days 14days 14days 14days 15days 15days 15days 15days 15days 15days	0.27M/M 0.27M/M 0.27M/M 0.27M/M 0.27M/M 0.27M/M 0.27M/M 0.27M/M 0.27M/M 0.27M/M 0.27M/M 0.27M/M 0.47M/M 0.47M/M 0.30M/M 0.30M/M 0.23M/M 0.23M/M 0.23M/M 0.23M/M 0.23M/M 0.23M/M 0.23M/M 0.23M/M 0.23M/M 0.23M/M 0.23M/M 0.23M/M 0.23M/M 0.23M/M 0.25M/M 0.55M/M 0.55M/M 0.25M/M 0.25M/M 0.55M/M 0.25M/M 0.25M/M 0.55M/M 0.25M/M 0.25M/M 0.25M/M 0.55M/M 0.25M/M 0.25M/M 0.25M/M 0.25M/M 0.25M/M 0.55M/M 0.25M/M 0.5	JRI JRI SMBC MRI. MRI. Nippon Koei Co., Ltd. West JEC West JEC West JEC West JEC
Yutaka Koichiro Yoko Norio Tomoaki Masako Shatei Shatei Takeshi Tatsunari Teruaki Tijo John	MIKI DANNO CHIVERS SHIGETOMI HIROSE TERAMOTO IRI YAMAMOTO HAYASHI MATSUO THOMAS	Project Management B1 Project Management B2 Project Management C Multi-purpose Use of Geothermal Energy A Business Administration/Finance A Environmental and Social Safeguard A Environmental and Social Safeguard B Power Plant Engineering A Power Plant Engineering C Power Plant Engineering D1	2016/9/10 2016/12/10 2016/12/10 2016/12/10 2016/12/10 2016/10/8 2017/3/18 2017/9/16 2016/10/22 2017/2/25 2017/2/25 2017/12/2 2016/9/4 2016/11/20 2017/4/16 2018/1/4 2016/9/10 2016/11/19 2017/1/21 2018/1/7 2018/4/8 2016/4/23 2016/11/27 2018/5/12 2016/11/27 2018/5/12 2018/5/12 2018/5/12 2018/5/12		2016/9/17 2016/12/17 2016/12/17 2016/10/15 2017/3/25 2017/3/25 2017/3/25 2016/10/29 2017/3/4 2016/10/29 2017/4/27 2016/9/17 2016/12/9 2016/12/10 2016/9/24 2016/11/27 2018/1/20 2018/1/20 2018/1/20 2016/12/10 2016/12/10 2016/12/10 2016/12/10 2016/12/10 2016/12/10 2017/3/11 2018/2/10 2018/2/2	8days 9days 12days 7days 15days 9days 9days 9days 14days 7days 14days 8days 15days 15days 15days 15days 15days 14days 14days 14days 14days 14days 14days 14days 14days 14days 15days 15days 15days 15days 15days <	0.27M/M 0.27M/M 0.27M/M 0.27M/M 0.27M/M 0.27M/M 0.27M/M 0.27M/M 0.27M/M 0.27M/M 0.27M/M 0.47M/M 0.47M/M 0.30M/M 0.30M/M 0.30M/M 0.23M/M 0.23M/M 0.23M/M 0.23M/M 0.23M/M 0.23M/M 0.23M/M 0.23M/M 0.23M/M 0.23M/M 0.23M/M 0.23M/M 0.23M/M 0.23M/M 0.23M/M 0.50M/M 0.50M/M 0.23M/M 0.23M/M 0.50M/M 0.23M/M 0.23M/M 0.23M/M 0.20M/M 0.23M/M 0.20M/M 0.20M/M 0.20M/M	JRI JRI SMBC MRI. MRI. Nippon Koei Co., Ltd. West JEC West JEC West JEC West JEC
Yutaka Koichiro Yoko Norio Tomoaki Masako Shatei Shatei Takeshi Tatsunari Teruaki Tijo John Rami Sultan	MIKI DANNO CHIVERS SHIGETOMI HIROSE TERAMOTO IRI YAMAMOTO HAYASHI MATSUO THOMAS	Project Management B1 Project Management B2 Project Management C Multi-purpose Use of Geothermal Energy A Business Administration/Finance A Environmental and Social Safeguard A Environmental and Social Safeguard B Power Plant Engineering A Power Plant Engineering D1 Power Plant Engineering D1 Power Plant Engineering D2	2016/9/10 2016/12/10 2016/12/10 2016/12/10 2016/10/8 2017/3/18 2017/3/18 2017/9/16 2016/10/22 2017/2/25 2017/2/25 2017/12/2 2016/9/4 2016/11/20 2017/4/16 2018/1/14 2016/9/10 2016/11/27 2018/4/8 2016/4/23 2016/11/27 2018/1/27 2018/1/27 2018/1/27 2018/1/27 2018/1/27 2018/1/28 2018/1/28		2016/9/17 2016/12/17 2016/12/17 2016/10/15 2017/3/25 2017/3/25 2017/3/4 2016/10/29 2017/3/4 2016/10/29 2016/12/9 2016/12/9 2016/12/10 2018/1/20 2018/1/20 2018/1/20 2018/1/20 2018/1/20 2018/2/10 2016/12/10 2016/12/10 2018/2/10 2018/2/2 2018/2/2	8days 14days 7days 14days 9days 9days 9days 14days 7days 14days 14days 15days 6days	0.27M/M 0.27M/M 0.27M/M 0.27M/M 0.27M/M 0.27M/M 0.27M/M 0.27M/M 0.27M/M 0.27M/M 0.27M/M 0.27M/M 0.47M/M 0.30M/M 0.30M/M 0.30M/M 0.30M/M 0.30M/M 0.23M/M 0.23M/M 0.23M/M 0.23M/M 0.23M/M 0.23M/M 0.23M/M 0.23M/M 0.50M/M 0.47M/M 0.23M/M 0.50M/M 0.23M/M 0.20M/M 0.20M/M 0.20M/M 0.20M/M	JRI JRI SMBC MRI. MRI. Nippon Koei Co., Ltd. West JEC West JEC West JEC West JEC YEC YEC
Yutaka Koichiro Yoko Norio Tomoaki Masako Shatei Shatei Takeshi Tatsunari Teruaki Tijo John Rami Sultan	MIKI DANNO CHIVERS SHIGETOMI HIROSE TERAMOTO IRI YAMAMOTO HAYASHI MATSUO THOMAS MOHAMMED SAEED	Project Management B1 Project Management B2 Project Management C Multi-purpose Use of Geothermal Energy A Business Administration/Finance A Environmental and Social Safeguard A Environmental and Social Safeguard A Power Plant Engineering A Power Plant Engineering C Power Plant Engineering D1 Power Plant Engineering D2	2016/9/10 2016/12/10 2016/12/10 2016/12/10 2016/12/10 2016/10/8 2017/3/18 2017/3/18 2017/3/18 2017/3/18 2016/10/22 2017/2/25 2017/2/25 2017/12/2 2016/9/4 2016/11/20 2016/11/20 2016/11/19 2016/11/27 2018/1/27 2018/5/12 2018/1/27 2018/1/27 2018/1/27 2018/1/27 2018/1/27 2018/1/28 2018/1/28	~ ~	2016/9/17 2016/12/17 2016/12/17 2016/10/15 2017/3/25 2017/9/23 2016/10/29 2017/3/4 2017/12/9 2016/9/17 2016/12/9 2016/12/9 2016/11/27 2016/11/27 2016/11/27 2016/11/27 2016/11/27 2018/1/20 2016/12/10 2016/12/10 2016/12/10 2016/12/10 2016/12/10 2016/12/10 2016/12/10 2016/12/10 2016/12/10 2016/12/10 2016/12/10 2016/12/10 2018/5/26 2018/2/2	8days 14days 7days 9days 9days 9days 9days 14days 7days 14days 14days 15days 15days 14days 14days 15days 15days 15days 15days 15days 15days 6days 6days 6days	0.27M/M 0.27M/M 0.27M/M 0.27M/M 0.27M/M 0.27M/M 0.27M/M 0.27M/M 0.27M/M 0.27M/M 0.27M/M 0.27M/M 0.40M/M 0.40M/M 0.30M/M 0.30M/M 0.30M/M 0.30M/M 0.23M/M 0.23M/M 0.23M/M 0.23M/M 0.23M/M 0.23M/M 0.23M/M 0.23M/M 0.23M/M 0.20M/M 0.2	JRI JRI SMBC MRI. MRI. Nippon Koei Co., Ltd. West JEC West JEC West JEC West JEC YEC YEC

10: List of Trainings, Training Counterparts and Certificates Issued

添付資料 10: List of Trainings, Training Counterparts and Certificates Issued

Team Leader GDC Trainer

	FULL NAME POSITION DEPARTMENT							
Output 2 Related - Geoscience (Geothermal Resource Assessment)								
1	Anthony	Wamalwa	Deputy Manager	Geothermal Resource Assessment (GRA)				
			Geology					
1	Tito	Lopeyok	Geologist	Geology Group, GRA, GDC				
2	Loice	Kipchumba	Geologist	Geology Group, GRA, GDC				
3	Peter	Mbia	Senior Geologist	Geology Group, GRA, GDC				
4	Lucy	Njue	Senior Geologist	Geology Group, GRA, GDC				
5	Geoffrey	Mibei	Geologist	Geology Group, GRA, GDC				
6	Marietta	Mutonga	Geologist	Geology Group, GRA, GDC				
- 7	Emily	Kahiga	Geologist	Geology Group, GRA, GDC				
8	David	Mwai	Geologist	Geology Group, GRA, GDC				
9	David	Oduor	Geologist	Geology Group, GRA, GDC				
10	Fredrick	Mutua	Geologist	Geology Group, GRA, GDC				
11	Noel	Ndombi	Geologist	Geology Group, GRA, GDC				
12	Michael	Lokirima	Geologist	Geology Group, GRA, GDC				
13	Evans	Kimaiyo	Geologist	Geology Group, GRA, GDC				
14	Chebon	Chebet	Geologist	Geology Group, GRA, GDC				
15	Sospeter	Msenya	Technician	Geology Group, GRA, GDC				
			Geochemistry					
1	George	Igunza	Geochemist	Geochemistry Group, GRA, GDC				
2	Isaac	Kanda	Senior Geochemist	Geochemistry Group, GRA, GDC				
3	Sylvia	Joan	Senior Geochemist	Geochemistry Group, GRA, GDC				
4	Jeremiah	Kipng'ok	Geochemist	Geochemistry Group, GRA, GDC				
5	Evans	Bett	Geochemist	Geochemistry Group, GRA, GDC				
6	Lawrence	Ranka	Geochemist	Geochemistry Group, GRA, GDC				
- 7	Leakey	Ochieng	Geochemist	Geochemistry Group, GRA, GDC				
8	Shilla	Chepkemoi	Geochemist	Geochemistry Group, GRA, GDC				
9	Fridah	Mwanyasi	Geochemist	Geochemistry Group, GRA, GDC				
			Geophysics					
1	Raymond	Mwakirani	Geophysicist	Geophysics Group, GRA, GDC				
2	Joseph	Gichira	Geophysicist	Geophysics Group, GRA, GDC				
3	Yussuf	Noor	Geophysicist	Geophysics Group, GRA, GDC				
4	Deflorah	Kangogo	Geophysicist	Geophysics Group, GRA, GDC - Micro seismic				
5	Fredrick	Ogada	Geophysicist	Geophysics Group, GRA, GDC				
6	Robert	Mukiri	Technician	Geophysics Group, GRA, GDC				
7	Peter	Mwarangu	Technician	Geophysics Group, GRA, GDC				
8	Paul	Kiprono	Technician	Geophysics Group, GRA, GDC				
9	David	Basweti	Technician	Geophysics Group, GRA, GDC				
10	Fredrick	Mayoga	Technician	Geophysics Group, GRA, GDC				
11	Magdalene	Kariuki	rechnician	Geophysics Group, GRA, GDC				
12	Rose	Nanjumbia	Technician	Geophysics Group, GRA, GDC				
13	Mathew	Arthur	Senior Technician	Drilling Equipment Maintenance				
	1		Laboratories					
1	Jared	Nyamongo Wama ci	Chief Lab Technician (Chemistry)	Chemical Laboratory, GRA, GDC				
2	Lyne	wamani	Lab Technician (Chemistry)	Chemical Laboratory, GRA, GDC				
3	Losing	kinara	Lab Technician (Chemistry)	Chemical Laboratory, GRA, GDC				
4	Dahal	ISIDa	Lab Technician (Chemistry)	Chemical Laboratory, GRA, GDC				
5	Kanel	baya Howo	Lab Technician (Chemistry)	Chemical Laboratory, GRA, GDC				
- 7	Judy	newa Nyakwaba	Lab Technician (Chemistry)	Chemical Laboratory, GRA, GDC				
	Lawrence	Nyakweba	Lab Technician (Chemistry)	Chemical Laboratory, GRA, GDC				
ð o	Nicholas	Kvalo	Lab Technician (Chemistry)	Chemical Laboratory, GRA, GDC				
9	Vincent		Lab Technician (Chemistry)	Geology Laboratory, GRA, GDC				
10	Gerald	Niim	Lab Technician (Geology)	Geology Laboratory, GRA, GDC				
11	Gerdiu	ingin u	cao recimician (Georogy)	ocorogy caboratory, GRA, GDC				

Class room session on 2016

	Surname	Given Name	GDC Designation	Designation
	-	-	_	_
1	Keny	Fred Strencer	Engineer III D.O.	Shift Leader
2	Mburu	Stanley Muhia	Engineer III, Drilling Equipment Maintenance (Maintenance Engineer)	Maintenance Engineer
З	Musalia	Doughty Alunga	Engineer III, D.O	Shift Leader
4	Kabua	Geoffrey Kimani	Rig Maintenance Electrician	Electrician
5	Kihonge	George	Senior Driller	Driller
6	Kirui	Nancy Jeptoo	Engineer III – Planning and Logistics	Planning and Logistics
7	Mutahi	Peter Mbakwa	Senior Driller II	Driller
8	Zachariah	Eric Mumo	Senior Driller II	Driller
9	Onchiri	Dennis Mogaka	Senior Driller II	Driller
10	Mburu	Peter Muchendu	Driller	Driller
11	Sogomo	Elkana	Engineer III, Drilling Operations	Shift Leader
12	Ngeno	Jared Kiplangat	Engineer III, D.O	Shift Leader
13	Barkebo	Denis Chepchieng	Engineer III, Drilling Operations	Shift Leader
14	Kirui	Gilbert Kiplangat	Driller	Driller
15	Kipkemoi	Willy Mutai	RMT (Mechanical)	Mechanic
16	Mboya	Edwin	Derrickman I	Derrickman
17	Chege	James Njenga	Sr. Driller II	Driller
18	Ngure	Edward Kimani	Derrickman I	Derrickman
19	Sigei	Geoffrey Kipkoech	Rig Maintenance Mechanic	Mechanic
20	Bititi	Abraham Kirya	Derrickman IV	Derrickman
21	Muriithi	Patrick Muturi	Rig Maintenance Technician	TBD, EMT
22	Mwakisachi	Kennedy R. Mwaisaka	Senior Driller II	Driller
23	Mutuku	Paul	Derrickman I	Derrickman
24	Cheruiyot	Malel Ernest	Senior Driller	Driller
25	Mohamed	Abdirashid Muktar	Cementing Lechnician	Cementing Lechnician
26	Kamau	Martha Wairimu	Officer, Logistics	Planning and Logistics
27	Kiplagat	Rono	Rig Maintenance Mechanic	Mechanic
28	Kirui	Felix	Engineer III, Urilling Planning and Logistics	Planning and Logistics
29	Kipkurui	Kibor Development Melle	Driller I Region Dellien II	Driller
3U 04	Maluwa	Bernard Nglie	Senior Driller II Die Melatanamen Mashania	Driller Maakaala
31 90	Viakumi	Lawrence Karuga	Rig Maintenance Mechanic	Nechanic Depoind and Logistics
32 99	Abdultohmon	Paul Coid Abdulenhim	Ag Apet Driller, Derriekmen I	Planning and Lugistics
33 94	Adduiranman	Said Abduiranim Depiel Megueb	Ag. Asst. Dhiler, Demokman I	Demokman
95	Wafula	Cliffford Motto	Accistant Drillor	Dorrickmon
96	Nom	Dotor Muriuki	Pig Maintananga Maghania	Machania
37	Nkanata	Paul Ndaraha	Rig Maintenance Mechanic	Mechanic
38	Waniala	Godfrey	Derrickman II	Derrickman
39	Niuguna	Simon	Technician Cementing	Cementing Technician
40	Riungu	Michael	Rig Maintenance Electrician	Flectrician
41	Wachira	Stanley	Derrickman I	Derrickman
42	Olwenv	Maxwell Akech	Drilling Supervisor	Shift Leader
43	Nzuki	Patrick M.	Rig Maintenance Mechanic	Mechanic
44	Mutaki	Emmanuel Kundu	Driller I	Driller
45	Musvoka	Felix Ngui	Rig Maintenance Electrician	Electrician
46	Rob	Eric Cheruiyot	Rig Maintenance Mechanic	Mechanic
47	Lepapa	Stephen	Driller	Driller
48	Simiyu	Job	Senior Driller II	Driller
49	Omondi	Eugene	Snr Rig Technician	TBD, EMT
50	Wanyama	Charles	Derrickman II	Derrickman
51	Chobong	Robert	Ag. A. Driller, Derrickman IV	Derrickman
52	Petu	John Mrima	Cementing Technician	Cementing
53	Baraza	Ramadhan	Derrickman II	Derrickman
54	Kipyego	Elijah	Driller I	Driller
55	Otieno	Alvins	Derrickman II	Derrickman
56	Supeyo	Kilelu Rushano	Floorman	Floorman
57	Kithinji	Morris David	Derrickman II	Derrickman
58	Lukorito	Henry Wabwile	Rig Maintenance Technician	Mechanic
59	Simiyu	Dennis Mukunda	Rig Maintenance Mechanic	Mechanic
60	Makau	Joseph Muema	Rig Maintenance Electrician	Electrician
61	Wanjala	Benson	Derrickman I	Derrickman
62	Oyier	Kennedy Onyango	Rig Maintenance Mechanic	Mechanic
63	Njoroge	Joseph Njogu	Derrickman I	Derrickman
64	Ochieng	Dan Ochiel	Rig Maintenance Electrician	Electrician
65	Mathenge	Phyllis Gathoni	Engineer III, D.O	Shift Leader
66	Wanyonyi	Eric Wekesa	Driller I	Driller
67	Ondhoro	Joshua Agunda	Driller I	Driller
68	Kimetto	Charles	Cementing, Laboratory Technician	Cementing Technician
69	Musyoka	Pius	Derrickman	Derrickman
70	Otieno	Maureen Atieno	Technician - Planning and Logistics	Planning and Logistics
71	Oyomno	Francis Agot	Senior Drilling Supervisor	Shift Leader
72	Muliro	Elvis	Derrickman I	Derrickman
/3	Miriti	Shem Ngichu	Rig Maintenance Technician	TBD, EMI
74	Torinke	Moses	Derrickman I	Derrickman
15 70	Riabaa	Cyrus Kyalo Salah	Senior Driller II	Comprocessor
70	LISUdS	Jaleii	Complessur IIIdi	COMPRESSUMMENT

Class room session on 2018

	Surname	Given Name, Middle	GDC Designation
		Name	
	▼	▼	▼
1	Petu	John Mrima	Cementing Technician
2	Kamau	Martha Wairimu	Officer, Logistics
3	Njuguna	Simon Gichuhi	Technician, Cementing
4	Mutahi	Peter Mhakwa	Senior Driller II
6	Mwanyasi	Fridah	Cementing Engineer
7	Musalia	Doughty Alunga	Engineer III. D.O
8	Mathenge	Phyllis Gathoni	Engineer III, D.O
9	Mburu	Peter Muchendu	Driller
10	Odongo	Dan Onyango	Cementing Truck Operator
11	Kirui	Gilbert Kiplangat	Driller
12	Gitu	Patrick Kanjuki	Safety Engineer
13	Kirui	Nancy Jeptoo	Engineer III – Planning and Logistics
14	Sigei	Geottrey Kipkoech	Rig Maintenance Mechanic
10	Muuru	otarney Murna	Drilling Equipment Maintenance
			(Maintenance Engineer)
16	Chege	James Njenga	Sr. Driller II
17	Mutuku	Paul	Derrickman I
18	Waswa	Martin	Drilling Engineer
19	Kihonge	George	Senior Driller
20	Sogomo	Elkana Kipchirchir	Engineer III, Unilling Operations
21	Ungwae	Samson	Engineer II, DU
22	Nadua	Geottrey Kimani	Rig Waintenance Electrician
23 24	Mualuka Otieno	Derhard Nglië Meureen Atiene	Senior Driller II Technician - Planning and Logistics
24 05	Waxami	maureen Aueno Fric Wakaca	Driller I
20 26	Ntabo	Dennis	Rig Maintenance Machania
20	Niapote	Dennis Deul Marsha	Rig Maintenance Mechanic
∠/ 00	inndilata Koziuki	Patar Nuereba	Pig Maintananca Flastrisian
20	Zaslavisla	Feter Nguun	Rig Maintenance Electrician
29 30	zachanan Miening	Lind Mum0 Vienne Achierer	Cementing Operator
31	Ohanva	Vincent	Engineer III
32	Mumo	Nincent Curus Kuslo	Senior Driller II
33	Onchiri	Dennis Mogaka	Senior Driller II
34	Kirongo	Eliud	Technician
35	Wango	John Paul Adero	Technician III
36	Makau	Joseph Muema	Rig Maintenance Electrician
37	Barkebo	Denis Chepchieng	Engineer III, Drilling Operations
38	Kirui	Felix	Engineer III, Drilling Planning and Logistics
39	Sitati	Mourice Mukhwana	Rig Maintenance Mechanic
40	Mwakisachi	Kennedy R. Mwaisaka	Senior Driller II
41	Mwadime	Hartwel	Derrickman IV
42	wanjala	Goarrey	Derrickman II
43	Mampo Kimana	Kurtz Njue	Maintenance Engineer III
44 45	Similar	- loh	Senior Driller II
16	Chohong	Pohort	Ag A Driller Derrickman IV
47	Wachira	Stanley	Derrickman I
48	Kipkurui	Kibor	Driller I
49	Miriti	Shem Ngichu	Rig Maintenance Technician
50	Wasike	Jeff Machyo	Maintenance Engineer
51	Takurit	Elijah	Technician
52	Mulanda	Frankline	Derrickman I
53	Mohamed	Abdirashid Muktar	Cementing Technician
54	Abdulrahman	Said Abdulrahim	Ag. Asst. Driller, Derrickman I
55	Kiprono	Paul Kimutai	Technician I (Tubulars)
56	Kimetto	Charles	Cementing, Laboratory Technician
57	Gathoni	Eudius	Electrician (Artisan IV)
58	Mwangangi	Francis	Derrickman IV
59	Mwangi	George Maina	Derrickman IV
б0 о:	Bititi	Abraham Kirya	Derrickman IV
01 60	Albano	Nickson Mwambere	Derrickman III Big Maintenance Engineer
02 60	Mexe	Austin Kipngetich	rig waintenance Engineer
03 64	Maeno	Jared Kinlangat	Engineer III D O
65	Ahalla	Benson Ogella	Derrickman
50 66	Omondi	Europhie Michael	Senior Rig Technician, Machania
50 67	Kithinii	Morrie David	Derrickmon II
68 68	Wesonga	Pascal	Senior Technician
 69	Kiraison	Kasino Sankek	Derrickman II
70	Tomitich	Philin Kinruto	RMT (Flectrical)
71	Kiplagat	Rono	Rig Maintenance Mechanic
72	Kosgei	Enock Cheruiyot	Senior Technician
73	Rotich	Martin Rohu	Drilling Engineer
74	Musyoka	Pius	Derrickman II
75	Kibicho	David Munene	Engineer III, D.O
76	Тоо	Geoffrey Kipkoech	RME (Mechanical)
77	Wafula	Cliffford Natto	Derrickman I
78	Kariuki	Peter Nganga	Rig Maintenance Engineer
79	Mwendwa	Joseph Muthama	Derrickman IV
80	Kipkoech	Patrick	AssistanT III, DPL
81	Magicho	Daniel	Drilling Engineer
02 03	MaKumi	Lawrence Karuga	Rig Maintenance Mechanic
83 94	Pob	John Gikunda	Derrickman II Pig Maintenance Mechanic
85	Lukorito	Henni Wahwilo	Rig Maintenance Technician
86	Cherubot	Malal Ernect	Senior Driller
00 87	Kiilu	Martin Jackson	Logistics Assistant (Tubulare)
88	Mwaura	Gideon Kiarie	Derrickman IV
89	Ogugo	Fredrick	Technician
90	Kanvi	Victor	Drilling Engineer
91	Juma	James	Technician
92	Keny	Fred Spencer	Engineer III, D.O
93	Awili	Billy	Drilling Engineer
94	Ondhoro	Joshua Agunda	Driller I
95	Githinji	David Wachira	Craftsman IV
96	Ng'ang'a	Eric	RMT (Mechanical)
97	Kenyo	Shadrach Kantai	Derrickman III

	NAME	Designation
1	ISAAC MAKUK	Drilling Engineer
2	PAUL NKANATA	Mechanical Technician
з	MOURICE SITATI	Mechanical Technician
4	BEN WANTOME	Welder
5	LAWRENCE WAMBUA	RigWelder
6	CHRISTOPHER KITHOME	RigWelder
7	DAVID MWANGI	Infrastructure Welder
8	JACKTONE ALELA	Infrastructure Welder



Team Leader GDC Trainer

FULL NAME				POSITION	DEPARTMENT		
Output 4 Related - R				eservoir Engineering (Geothermal Resour	e Management)		
1	Janet	Suwai	Jelagat	Senior Scientist	Geothermal Resource Management (GRM)		
2	Hilary	Mwawasi	Mwangeka	Engineer	Geothermal Resource Management (GRM)		
3	Angalwa	Arcadius	Muhanji	Engineer	Geothermal Resource Management (GRM)		
4	Edwin	Odum		Senior Engineer	Geothermal Resource Management (GRM)		
5	Michael	Sembele	Keter	Senior Engineer	Geothermal Resource Management (GRM)		
6	Richmond	Baraza		Engineer	Geothermal Resource Management (GRM)		
7	Kenneth	Kibet	Korir	Superintending Foreman	Geothermal Resource Management (GRM)		
8	John	Mwiti	Nkanata	Technician-Electrical	Geothermal Resource Management (GRM)		
9	Humphrey	Nvongesa		Technician	Geothermal Resource Management (GRM)		
10	Edwin	Kirarev		Engineer	Geothermal Resource Management (GRM)		
11	Patrick	Wandoe		Technician Electronics	Geothermal Resource Management (GRM)		
12	David	Nyagena		Senior Technician, Mechanical	Geothermal Resource Management (GRM)		
13	Leonard	Karani		Senior Technician, Mechanical	Geothermal Resource Management (GRM)		
14	George	Muriga		Engineer	Geothermal Resource Management (GRM)		
15	Stenhen	Onvango		Engineer	Geothermal Resource Management (GRM)		
16	Mosos	Chemeitoi		Engineer	Geothermal Resource Management (GRM)		
10	Dovid	Awori	Olando	Engineer	Geothermal Resource Management (GRM)		
10	David	Awon	Chikagan	Engineer	Geothermal Resource Management (GRM)		
18	Phillip	Buruai	Shikanga	Engineer	Geothermal Resource Management (GRM)		
19	Denis	Chirchir		Engineer	Geothermal Resource Management (GRM)		
20	Janet	Okoth		Engineer	Geothermal Resource Management (GRM)		
21	Joel	Ayonga		Engineer	Geothermal Resource Management (GRM)		
22	Ezekiel	Кіруедо	Kiptoo	Engineer	Corporate Planning & Strategy (CPS)		
			<u>Output 4 R</u>	elated - Data Integration / Database const	truction		
1	Levi	Shako		GIS Analyst, GIS Group	Geophysics/GIS Group, GRA		
2	Joseph	Mutua		Geologist, GIS Group	Geology/GIS Group, GRA		
3	Leonard	Wamalwa		GIS Analyst, GIS Group	GIS Group, GRA		
4	Lawrence	Lorogoi		GIS Analyst, GIS Group	GIS Group, GRA		
5	Beatrice	Mudibo		GIS Superintendant	GIS Group, GRA		
6	Irene	Mboin		GIS Superintendant	GIS Group, GRA		
- 7	Esther	Yator		GIS Technician	GIS Group, GRA		
8	Davis	Siele		GIS Technician	GIS Group, GRA		
9	Zablon	Mlawasi		GIS Technician	GIS Group, GRA		
				Output 5 Related - Plant Engineering			
1	Edwin		Odum	Senior Engineer	Geothermal Resource Management (GRM)		
2	Edwin		Kirarey	Electrical Engineer	Geothermal Resource Management (GRM)		
3	Laban		Mwangi	Electrical Technician	Geothermal Resource Management (GRM)		
4	Philip	Burudi	Shikanga	Engineer	Geothermal Resource Management (GRM)		
5	Leonard		Karani	Senior Technician	Geothermal Resource Management (GRM)		
6	Michael	Sembele	Keter	Senior Engineer – Mechanical	Geothermal Resource Management (GRM)		
7	Joel		Ayonga	Engineer	Geothermal Resource Management (GRM)		
8	George	Muchiri	Muriga	Engineer	Geothermal Resource Management (GRM)		
9	David		Awori	Engineer	Geothermal Resource Management (GRM)		
10	Hillary		Mwawasi	Engineer	Geothermal Resource Management (GRM)		
11	Dennis		Kiprono	Engineer	Geothermal Resource Management (GRM)		
12	Moses		Chemeitoi	Engineer	Geothermal Resource Management (GRM)		
13	Arcadius		Angalwa	Engineer	Geothermal Resource Management (GRM)		
14	James		Akali	Technician	Geothermal Resource Management (GRM)		
15	Ronald		Morusoi	Technician	Geothermal Resource Management (GRM)		
16	Moses	Baraza	Wafula	Technician	Geothermal Resource Management (GRM)		
17	Stephen		Odhiambo	Engineer	Geothermal Resource Management (GRM)		
18	lanet		Okoth	Engineer	Geothermal Resource Management (GRM)		
10	Wilfred	Mburu	Nioroge	Engineer	Safety Health & Environment (SHE)		
20	losenh	mouru	Mwandoo	Technician	Drilling Equipment Maintenance (DEM)		
20	Ezakial		Kinvere	Engineer	Corporate Planning & Stratogy (CPS)		
21	Hasson		Abdi	Engineer	Project Management		
22	ndssdfi Meger		Kodi	Engineer	Project Management		
23	woses	2	Kachumo	Engineer	Project Management		
24	John	KONO	Kibet	Engineer	Safety, Health & Environment (SHE)		

	Certificate of Merit	No.	Trainer	No.	Trainee
		1	Rosemary Njenga	3	Caroline Tele
	Ferraria Fundation Training LUGUU Dhara L	2	Diana Waringa	4	Shammah Kiptanui
12-1	ECONOMIC Evaluation framming Lincoll, Phase F			5	Joseph Mutahi
				6	Tunai Kinyanguk
12-2	Economic Evaluation Training I&II, Phase I			1	Solomon Sankaire
	-			_	
				<u> </u>	Desk for Kingle and
12-3	Economic Evaluation Training II&III, Phase I				Beatrice Kipchumba
	Certificate of Attendance		Trainer	No.	Trainee
12-4	Economic Evaluation Training II, Phase I				Dorothy Muriithi
				2	Bernard Rotich
12-5	Economic Evaluation Training III, Phase 1 (Corporate Model)			1	Jared Gekara
				2	Omar Ismail
	Contrificate of Manit	No	Trainer	No	Trainag
		140.	Trainer	140.	Trainee
12-6	Financial Modelling and Economic Evaluation Training (Basic)	1	Rosemary Njenga	3	Joseph Mutahi
12-0	mancial rodening and economic evaluation manning (basic)	2	Diana Waringa		
		2	Diana VValinga		
					Albert Panga
				1	
				2	Ezekiel Kipyego
				3	Hapanna Galgallo
12-7	Financial Modelling and Economic Evaluation Training	<u> </u>		4	Lydiah Khaemba
	(Basic&Advanced)	<u> </u>		5	Noel Mbashu
		<u> </u>		6	Omar Ismail
		<u> </u>		0	Lucy Nyambura
		-		0	Sandra Soy
				10	Solomon Sankaire
			1		
	Certificate of Merit		Trainer	No.	Trainee
				1	Lucy Mukiri
				2	Caroline Tele
	Business Administration & Finance I&II, Phase I	<u> </u>		3	Rosemary Njenga
13-1	business Administration & mance lon, maser	\vdash		5	Moses Kachumo
				6	Shammah Kiptanui
				7	Bernard Rotich
				8	Jacklyne Wakhungu
	Certificate of Attendance		Trainer	No.	Trainee
	Certificate of Attendance		Trainer	No.	Trainee Beatrice Kipchumba
	Certificate of Attendance		Trainer	No. 1 2	Trainee Beatrice Kipchumba Sandra Soy
13-2	Certificate of Attendance Business Administration & Finance I, Phase 1		Trainer	No. 1 2 3	Trainee Beatrice Kipchumba Sandra Soy Lydia Odhiambo
13-2	Certificate of Attendance Business Administration & Finance I, Phase 1		Trainer	No. 1 2 3 4 5	Trainee Beatrice Kipchumba Sandra Soy Lydia Odhiambo Lydia Khaemba David Tanui
13-2	Certificate of Attendance Business Administration & Finance I, Phase 1		Trainer	No. 1 2 3 4 5	Trainee Beatrice Kipchumba Sandra Soy Lydia Odhiambo Lydia Khaemba David Tanui
13-2	Certificate of Attendance Business Administration & Finance I, Phase 1		Trainer	No. 1 2 3 4 5	Trainee Beatrice Kipchumba Sandra Soy Lydia Odhiambo Lydia Khaemba David Tanui Dorothy Murrithi Michaol Simira
13-2	Certificate of Attendance Business Administration & Finance I, Phase 1		Trainer	No. 1 2 3 4 4 5 1 1 2 2 3	Trainee Beatrice Kipchumba Sandra Soy Lydia Odhiambo Lydia Khaemba David Tanui Dorothy Muriithi Michael Simiyu Benard Finch
13-2	Certificate of Attendance Business Administration & Finance I, Phase 1		Trainer	No. 1 2 3 4 4 5 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7	Trainee Beatrice Kipchumba Sandra Soy Lydia Odhiambo Lydia Khaemba David Tanui Dorothy Muriithi Michael Simiyu Benard Finch Albert Panga
13-2	Certificate of Attendance Business Administration & Finance I, Phase 1 Business Administration & Finance II, Phase I		Trainer	No. 1 2 3 4 5 1 2 3 4 5 5 5 5 5 5 5 5 5 5 5 5 5	Trainee Beatrice Kipchumba Sandra Soy Lydia Odhiambo Uydia Khaemba David Tanui Dorothy Muriithi Michael Simiyu Benard Finch Albert Panga Noel Mbashu
13-2	Certificate of Attendance Business Administration & Finance I, Phase 1 Business Administration & Finance II, Phase I		Trainer	No. 1 2 3 4 5 1 1 2 3 4 5 6 6 7 7 7 7 7 7 7 7 7 7 7 7 7	Trainee Beatrice Kipchumba Sandra Soy Lydia Odhiambo Lydia Odhiambo David Tanui Dorothy Muriithi Michael Simiyu Benard Finch Albert Panga Noel Mbashu Nelly Kibor Omar (smail
13-2	Certificate of Attendance Business Administration & Finance I, Phase 1 Business Administration & Finance II, Phase I		Trainer	No. 1 2 3 4 5 1 2 3 4 5 6 6 7 8	Trainee Beatrice Kipchumba Sandra Soy Lydia Odhiambo Lydid Khaemba David Tanui Dorothy Muriithi Michael Simiyu Benard Finch Albert Panga Nelly Kibor Omar Ismail Esther Nyambura
13-2	Certificate of Attendance Business Administration & Finance I, Phase 1 Business Administration & Finance II, Phase I		Trainer	No. 1 2 3 4 5 1 1 2 3 4 5 6 6 7 8 9 9	Trainee Beatrice Kipchumba Sandra Soy Lydia Odhiambo Lydia Odhiambo Lydia Abaemba David Tanui Dorothy Muriithi Michael Simiyu Benard Finch Albert Panga Noel Mbashu Nelly Kibor Omar Ismail Esther Nyambura Emmanuel Mwanthi
13-2	Certificate of Attendance Business Administration & Finance I, Phase 1 Business Administration & Finance II, Phase I Eastificate of Marit		Trainer	No. 1 2 3 4 4 5 5 1 1 2 2 3 3 3 4 5 5 7 7 7 8 9 9 9	Trainee Beatrice Kipchumba Sandra Soy Lydia Odhiambo Lydia Odhiambo Lydia Abaemba David Tanui Dorothy Muriithi Michael Simiyu Benard Finch Albert Panga Neel Mbashu Nelly Kibor Omar Ismail Esther Nyambura Emmanuel Mwanthi Trainee
13-2	Certificate of Attendance Business Administration & Finance I, Phase 1 Business Administration & Finance II, Phase I Certificate of Merit	No. 1	Trainer Trainer Rosemary Nienga	No. 1 1 2 3 3 4 4 5 1 1 2 3 4 5 5 7 8 9 9 No. 3	Trainee Beatrice Kipchumba Sandra Soy Lydia Ohlambo Lydia Ohlambo Lydia Khaemba David Tanui Dorothy Muriithi Michael Simiyu Benard Finch Albert Panga Noel Mbashu Nelly Kibor Omar Ismall Exther Nyambura Emmanuel Mwanthi Trainee Winfred Kinuthia
13-2	Certificate of Attendance Business Administration & Finance I, Phase 1 Business Administration & Finance II, Phase I Certificate of Merit		Trainer Trainer Trainer Rosemary Njenga Diana Waringa	No. 11 22 33 44 55 11 22 33 44 55 11 22 33 44 55 66 77 88 99 No. 33 44	Trainee Beatrice Kipchumba Sandra Soy Lydia Odhiambo Lydia Odhiambo David Tanui Dorothy Muriithi Michael Simiyu Benard Finch Albert Panga Neel Mbashu Nelly Kibor Omar Ismail Exther Nyambura Ermanuel Mwanthi Trainee Winfred Kinuthia Ezekel Kipyego
13-2	Certificate of Attendance Business Administration & Finance I, Phase 1 Business Administration & Finance II, Phase I Certificate of Merit	No. 1 2	Trainer Trainer Rosemary Njenga Diana Waringa	No. 1 2 3 4 5 6 77 8 99 No. 33 44 5 66 77 8 99 No. 33 44 5	Trainee Beatrice Kipchumba Sandra Soy Lydia Odhiambo Lydia Odhiambo David Tanui Dorothy Muriithi Michael Simiyu Benard Finch Albert Panga Noel Mbashu Nelly Kibor Omar Ismail Esther Nyambura Emmanuel Mwanthi Trainee Winfred Kinuthia Ezekela Kipyego Cymthia Wanjiku
13-2	Certificate of Attendance Business Administration & Finance I, Phase 1 Business Administration & Finance II, Phase I Certificate of Merit	No. 1 2	Trainer Trainer Rosemary Njenga Diana Waringa	No. 1 2 3 4 5 1 2 3 4 5 6 7 8 9 No. 3 4 5 6 7 8 9 No. 3 4 5	Trainee Beatrice Kipchumba Sandra Soy Lydia Odhiambo Lydia Odhiambo David Tanul Dorothy Muriithi Michael Simiyu Benard Finch Albert Panga Noel Mbashu Nelly Kloor Omar Ismail Esther Nyambura Emmanuel Mwanthi Trainee Winfred Kinuthia Ezekiel Kipyego Oynthia Wanjiku Grace Murage
13-2	Certificate of Attendance Business Administration & Finance I, Phase 1 Business Administration & Finance II, Phase I Certificate of Merit Business Administration & Finance I&II, Phase 2	No. 1	Trainer Trainer Rosemary Njenga Diana Waringa	No. 1 2 3 4 5 1 2 3 4 5 6 6 77 8	Trainee Beatrice Kipchumba Sandra Soy Lydia Odhiambo Lydia Odhiambo Lydia Abaemba David Tanui Dorothy Muriithi Michael Simiyu Benard Finch Albert Panga Neel Mbashu Neel Mbashu Neel Mbashu Neel Mbashu Trainee Winfred Kinuthia Ezekel Kipyego Cynthia Wanjku Grace Murage Marc Wanayeku Jared Gakera
13-2	Certificate of Attendance Business Administration & Finance I, Phase 1 Business Administration & Finance II, Phase I Certificate of Merit Business Administration & Finance I&II, Phase 2	No. 1 2	Trainer Trainer Rosemary Njenga Diana Waringa	No. 1 2 3 4 5 6 6 77 8 9 No. 33 44 55 66 77 8 66 77 78 8 9	Trainee Beatrice Kipchumba Sandra Soy Lydia Ohlambo Lydia Ohlambo Lydia Khaemba David Tanui Dorothy Muriithi Michael Simiyu Benard Finch Albert Panga Noel Mbashu Noel Mbashu Noel Mbashu Nelly Kibor Omar Ismall Exther Nyambura Emmanuel Mwanthi Trainee Winfred Kinuthia Ezeklei Kipyego Cynthia Wanjiku Grace Murage Marce Wanayeku Jared Gakera Michael Simiyu
13-2	Certificate of Attendance Business Administration & Finance I, Phase 1 Business Administration & Finance II, Phase I Certificate of Merit Business Administration & Finance I&II, Phase 2	No. 1 2	Trainer Trainer Trainer Rosemary Njenga Diana Waringa	No. 1 2 3 4 5 6 77 8 9 77 8 9 9 10	Trainee Beatrice Kipchumba Sandra Soy Lydia Odhiambo Lydia Odhiambo Lydia Khaemba David Tanui Dorothy Muriithi Michael Simiyu Beardr Finch Albert Panga Noel Mbashu Nelly Kibor Omar Ismail Esther Nyambura Ermanuel Mwanthi Trainee Winfred Kinuthia Ezekiel Kipyego Oynthia Wanjiku Grace Murage Marc Wamayeku Jared Gakera Michael Simiyu Kivin Leyan Omar Ismail
13-2	Certificate of Attendance Business Administration & Finance I, Phase 1 Business Administration & Finance II, Phase I Certificate of Merit Business Administration & Finance I&II, Phase 2	No. 11	Trainer Trainer Trainer Rosemary Njenga Diana Waringa	No. 1 2 3 4 55 11 2 33 44 55 6 6 77 88 99 No. 33 44 55 6 77 78 99 100 111	Trainee Beatrice Kipchumba Sandra Soy Lydia Odhambo Lydia Odhambo David Tanui Dorothy Muriithi Michael Simiyu Benard Finch Albert Panga Noel Mbashu Nelly Kibor Omar Ismail Exther Nyambura Ermanuel Mwanthi Trainee Winfred Kinuthia Erzekel Kipyego Cynthia Wanjiku Grace Murage Minchael Simiyu Kevin Leyian Omar Ismail Jared Gakera Michael Simiyu Kevin Leyian Omar Ismail Joseph Mutahi
13-2	Certificate of Attendance Business Administration & Finance I, Phase 1 Business Administration & Finance II, Phase I Certificate of Merit Business Administration & Finance I&II, Phase 2	No. 11	Trainer Trainer Rosemary Njenga Diana Waringa	No. 1 2 4 55 11 2 33 44 55 11 2 33 44 55 66 77 88 99 No. 33 44 55 66 77 88 99 100 111 122 133	Trainee Beatrice Kipchumba Sandra Soy Lydia Odhiambo Lydia Odhiambo David Tanui Dorothy Muriithi Michael Simiyu Benard Finch Albert Panga Noel Mbashu Nelly Kibor Omar Ismail Esther Nyambura Ermanuel Mwanthi Trainee Winfred Kinuthia Ezekela Kipyego Cynthia Wanjiku Grace Murage Michael Simiyu Kevin Leyian Omar Ismail Joseph Mutahi Faish Muthod
13-2	Certificate of Attendance Business Administration & Finance I, Phase 1 Business Administration & Finance II, Phase I Certificate of Merit Business Administration & Finance I&II, Phase 2	No. 11 2	Trainer Trainer Trainer Rosemary Njenga Diana Waringa	No. 1 2 3 4 5 6 77 8 9 100 11 12 13 44 55 66 77 78 99 100 111 12 13	Trainee Beatrice Kipchumba Sandra Soy Lydia Odhiambo Lydia Odhiambo Lydia Abaemba David Tanui Dorothy Muriithi Michael Simiyu Benard Finch Albert Panga Noel Mbashu Nelly Kibor Omar Ismail Ether Nyambura Emmanuel Mwanthi Trainee Winfred Kinuthia Erekel Kipyego Cynthia Wanjiku Grace Murage Marc Wanayeku Jared Gakera Michael Simiyu Kevin Leyian Omar Ismail Joseph Mutahi Faish Muthodi
13-2	Certificate of Attendance Business Administration & Finance I, Phase 1 Business Administration & Finance II, Phase 1 Certificate of Merit Business Administration & Finance I&II, Phase 2	No. 1 2	Trainer Trainer Trainer Trainer Rosemary Njenga Diana Waringa	No. 1 2 3 4 5 6 77 8 9 No. 33 44 55 66 77 8 9 10 11 12 13 11 12 13	Trainee Beatrice Kipchumba Sandra Soy Lydia Odhiambo Lydia Odhiambo Lydia Khaemba David Tanui Dorothy Muriithi Michael Simiyu Benard Finch Albert Panga Noel Mbashu Nelly Kibor Omar Ismail Eakel Kipyego Cynthia Wanjiku Grace Murage Michael Simiyu Kevin Leyian Omar Ismail Joseph Mutahi Faish Muthodi Faith Murdiel Faith Murdiel Faith Muragi
13-2	Certificate of Attendance Business Administration & Finance I, Phase 1 Business Administration & Finance II, Phase I Certificate of Merit Business Administration & Finance I&II, Phase 2	No. 1 2	Trainer Trainer Trainer Rosemary Njenga Diana Waringa	No. 1 1 2 2 3 4 4 5 5 1 1 2 2 3 3 4 5 6 6 6 7 7 8 9 9 9 10 111 12 13 13 1 2 3	Trainee Beatrice Kipchumba Sandra Soy Lydia Ohlambo Lydia Ohlambo Lydia Khaemba David Tanui Dorothy Muriithi Michael Simiyu Benard Finch Albert Panga Noel Mbashu Noel Mbashu Noel Mbashu Nelly Kibor Omar Ismall Exther Nyambura Ermanuel Mwanthi Trainee Winfred Kinuthia Erekiel Kipyego Oynthia Wanjiku Grace Murage Marc Wanayeku Jared Gakera Michael Simiyu Kevin Leyian Omar Ismall Joseph Mutahi Faish Muthodi Faith Mwangi Fathe Maimuna Shammah Kiptanul
13-2	Certificate of Attendance Business Administration & Finance I, Phase 1 Business Administration & Finance II, Phase I Certificate of Merit Business Administration & Finance I&II, Phase 2	No. 1 2	Trainer	No. 1 1 2 2 3 4 4 5 5 1 1 2 2 3 4 4 5 5 6 6 6 6 6 6 6 6 6 6 6 6 10 11 12 13 11 12 2 3 4 4 4 4	Trainee Beatrice Kipchumba Sandra Soy Lydia Odhiambo Lydia Odhiambo Lydia Khaemba David Tanui Dorothy Muriithi Michael Simiyu Beanar Finch Albert Panga Neel Mbashu Nelly Kibor Omar Ismail Esther Nyambura Ermanuel Mwanthi Trainee Winfred Kinuthia Ezekiel Kipyego Oynthia Wanjiku Grace Murage Marc Wamayeku Jared Gakera Michael Simiyu Kevin Leyian Omar Ismail Jaseph Mutahi Faish Muthodi Faith Mwangi Fathe Maimuna Shammah Kiptanui Henry Taabu
13-2	Certificate of Attendance Business Administration & Finance I, Phase 1 Business Administration & Finance II, Phase I Certificate of Merit Business Administration & Finance I&II, Phase 2 Business Administration & Finance I, Phase 2	No. 11 2	Trainer Trainer Trainer Trainer Comparison Trainer Comparison Trainer Comparison No. 1 12 3 44 5 11 2 23 4 44 5 66 6 66 6 66 6 77 8 99 9 13 4 122 13 111 12 13 4 55 5 66 5	Trainee Beatrice Kipchumba Sandra Soy Lydia Odhiambo Lydia Odhiambo David Tanui Dorothy Muriithi Michael Simiyu Benard Finch Albert Panga Noel Mbashu Nelly Kibor Omar Ismail Exther Nyambura Ermanuel Mwanthi Trainee Winfred Kinuthia Erzekiel Kipyego Cynthia Wanjiku Grace Murage Michael Simiyu Kevin Leylan Omar Ismail Jared Gakera Michael Simiyu Kevin Leylan Omar Ismail Faish Muthodi Faith Mwangi Fathe Maimuna Shammah Kiptanul Henry Taabu ChaelsBengo	
13-2	Certificate of Attendance Business Administration & Finance I, Phase 1 Business Administration & Finance II, Phase I Certificate of Merit Business Administration & Finance I & II, Phase 2 Business Administration & Finance I, Phase 2	No. 1 2	Trainer Trainer Trainer Trainer Rosemary Njenga Diana Waringa	No. No. 1 1 2 2 3 3 4 4 5 6 6 7 7 8 9 9 100 11 12 2 33 4 4 4 5 6 6 6 7 7 8 7 10 12 33 1 12 2 33 4 4 4 5 6 6 6	Trainee Beatrice Kipchumba Sandra Soy Lydia Odhiambo Lydia Odhiambo Lydia Abaemba David Tanui Dorothy Muriithi Michael Simiyu Benard Finch Albert Panga Noel Mbashu Nelly Kibor Omar Ismail Esther Nyambura Erakela Kinyego Cynthia Wanjiku Grace Murage Michael Simiyu Kevin Leyian Omar Ismail Joseph Mutahi Faish Muthodi Shammah Kiptanui Henry Taabu CharlesSengo Bob Nichabe Lak Kinuia
13-2	Certificate of Attendance Business Administration & Finance I, Phase 1 Business Administration & Finance II, Phase 1 Certificate of Merit Business Administration & Finance I&II, Phase 2 Business Administration & Finance I, Phase 2	No. 1	Trainer Trainer Trainer Rosemary Njenga Diana Waringa	No. No. 1 1 2 3 4 4 5 6 6 6 7 8 9 9 100 11 111 12 133 4 4 5 6 6 77 8 111 12 123 33 4 4 5 6 6 6 77 8	Trainee Beatrice Kipchumba Sandra Soy Lydia Ohlambo Lydia Ohlambo Lydia Khaemba David Tanui Dorothy Muriithi Michael Simiyu Benard Finch Albert Panga Noel Mbashu Neel Mbashu Neel Mbashu Neel Mbashu Neel Mbashu Trainee Emmanuel Mwanthi Trainee Trainee Michael Simiyu Exekel Kiyvego Cynthia Wanjiku Grace Murage Marc Wanayeku Jared Gakera Michael Simiyu Kevin Leyian Omar Ismail Joseph Mutahi Fash Muthodi Fath Murona Shammah Kytanul Henry Taabu CharlesBengo Bob Nichabe Jack Kiruja Lucy Mukini
13-2	Certificate of Attendance Business Administration & Finance I, Phase 1 Business Administration & Finance II, Phase 1 Certificate of Merit Business Administration & Finance I&II, Phase 2 Business Administration & Finance I, Phase 2	No. 1 2	Trainer	No. 1 2 3 3 4 55 6 77 78 99 No. 33 44 55 66 77 78 99 100 111 12 33 44 56 66 77 8 99 90 100 111 12 33 44 56 66 77 8 99 99	Trainee Beatrice Kipchumba Sandra Soy Lydia Ohlambo Lydia Ohlambo Lydia Khaemba David Tanui Dorothy Muriithi Michael Simiyu Beandr Finch Albert Panga Noel Mbashu Nelly Kibor Omar Ismail Exther Hyambura Emmanuel Mwanthi Trainee Winfred Kinuthia Erekiel Kipyego Cynthia Wanjiku Grace Murage Marc Wanayeku Jared Gakera Marc Wanayeku Jared Gakera Marc Wanali Joseph Mutahi Faith Mwangi Fathe Maimuna Shammah Kiptanui Henny Taabu CharlesBengo Bob Nichabe Jack Kiruja Lucy Mukiri Martin Mwangi
13-2	Certificate of Attendance Business Administration & Finance I, Phase 1 Business Administration & Finance II, Phase I Certificate of Merit Business Administration & Finance I&II, Phase 2 Business Administration & Finance I, Phase 2	No. 1 2	Trainer	No. 1 2 33 4 5 12 33 4 5 66 67 8 99 100 11 12 13 11 22 33 44 56 66 77 8 99 99 111 12 13 11 22 35 66 77 8 99 99 99 99 99 99 99 99 99 99 99 99 99 99 99 99 </td <td>Trainee Beatrice Kipchumba Sandra Soy Lydia Odhiambo Lydia Odhiambo Lydia Khaemba David Tanui Dorothy Muriithi Michael Simiyu Beanar Finch Albert Panga Noel Mbashu Nelly Kibor Omar Ismail Esther Nyambura Ermanuel Mwanthi Trainee Winfred Kinuthia Ezekiel Kipyego Oynthia Wanjiku Grace Murage Marc Wamayeku Jared Gakera Michael Simiyu Kevin Leyian Omar Ismail Doseph Mutahi Faish Muthodi Fathe Maimuna Shammah Kiptanui Henry Taabu CharlesBengo Bob Nichabe Jack Kiruja Lucy Mukiri Martin Mwangi Valentine Odhiambo</td>	Trainee Beatrice Kipchumba Sandra Soy Lydia Odhiambo Lydia Odhiambo Lydia Khaemba David Tanui Dorothy Muriithi Michael Simiyu Beanar Finch Albert Panga Noel Mbashu Nelly Kibor Omar Ismail Esther Nyambura Ermanuel Mwanthi Trainee Winfred Kinuthia Ezekiel Kipyego Oynthia Wanjiku Grace Murage Marc Wamayeku Jared Gakera Michael Simiyu Kevin Leyian Omar Ismail Doseph Mutahi Faish Muthodi Fathe Maimuna Shammah Kiptanui Henry Taabu CharlesBengo Bob Nichabe Jack Kiruja Lucy Mukiri Martin Mwangi Valentine Odhiambo
13-2	Certificate of Attendance Business Administration & Finance I, Phase 1 Business Administration & Finance II, Phase I Certificate of Merit Business Administration & Finance I&II, Phase 2 Business Administration & Finance I, Phase 2 Certificate of Attendance	No. 11 2	Trainer Trainer Trainer Trainer Trainer Trainer Trainer Trainer Trainer	No. 1 2 3 3 3 4 5 5 6 6 7 7 8 3 4 5 6 7 7 8 8 9 9 9 9 10 12 13 12 2 3 4 4 5 6 6 6 6 6 7 8 9 9 9 9 10 12 2 3 4 4 5 6 6 6 7 8 9 9 9 9 9 9 10 10	Trainee Beatrice Kipchumba Sandra Soy Lydia Odhiambo Lydia Odhiambo Lydia Khaemba David Tanui Dorothy Muriithi Michael Simiyu Beanarf Finch Albert Panga Noel Mbashu Nelly Kibor Omar Ismail Esther Nyambura Ermanuel Mwanthi Trainee Winfred Knuthia Ezekiel Kipyego Oynthia Wanjiku Grace Murage Marc Wamayeku Jared Gakera Michael Simiyu Kevin Leyian Omar Ismail Jaseph Mutahi Faish Muthodi Faith Mwangi Fathe Maimuna Shammah Kiptanui Henry Taabu CharlesBengo Bob Nikchabe Jack Kiruja Lucy Mukiri Martin Mwangi Valentine Odhiambo Trainee
13-2	Certificate of Attendance Business Administration & Finance I, Phase 1 Business Administration & Finance II, Phase I Certificate of Merit Business Administration & Finance I&II, Phase 2 Business Administration & Finance I&II, Phase 2 Business Administration & Finance I, Phase 2 Certificate of Attendance	No. 11	Trainer Trainer Trainer Trainer Trainer Trainer Trainer	No. 1 2 3 3 1 2 3 4 5 6 7 8 8 9 9 9 10 11 2 3 4 5 6 7 8 9 9 10 10 No. 3 3	Trainee Beatrice Kipchumba Sandra Soy Lydia Odhiambo Lydia Odhiambo Lydia Abaemba David Tanui Dorothy Muriithi Michael Simiyu Benard Finch Albert Panga Noel Mbashu Nelly Kibor Omar Ismail Ether Nyambura Ether Nyambur
13-2	Certificate of Attendance Business Administration & Finance I, Phase 1 Business Administration & Finance II, Phase I Certificate of Merit Business Administration & Finance I&II, Phase 2 Business Administration & Finance I&II, Phase 2 Business Administration & Finance I, Phase 2 Certificate of Attendance	No. 11 2	Trainer Trainer Trainer Trainer Trainer Rosemary Njenga Diana Waringa Trainer Trainer	No. No. 1 1 2 3 4 4 5 5 1 2 3 4 4 5 6 6 7 7 8 8 9 9 10 11 12 2 33 4 4 5 6 6 6 6 7 7 8 8 9 9 10 1 10 1 10 3	Trainee Beatrice Kipchumba Sandra Soy Lydia Odhiambo Lydia Odhiambo Lydia Odhiambo David Tanui Dorothy Muriithi Michael Simiyu Benard Finch Albert Panga Noel Mbashu Nelly Kibor Omar Ismail Esther Nyambura Erakel Kinyego Cynthia Wanithia Erakel Kinyego Cynthia Waniku Grace Murage Michael Simiyu Kevin Leyian Omar Ismail Joseph Mutahi Faish Muthodi Faith Muthodi Faith Muthodi Faith Muthodi Shammah Kiptanui Henry Taabu CharlesBengo Bob Nichabe Jack Kiruja Lucy Nyambura Hapanna Galgallo
13-2	Certificate of Attendance Business Administration & Finance I, Phase 1 Business Administration & Finance II, Phase 1 Certificate of Merit Business Administration & Finance I&II, Phase 2 Business Administration & Finance I&II, Phase 2 Business Administration & Finance I, Phase 2 Certificate of Attendance	No. 1 	Trainer Trainer Trainer Trainer Trainer Trainer Trainer Trainer Trainer	No. 1 2 3 4 5 1 2 3 4 5 1 2 3 4 5 6 6 7 7 8 9 10 12 3 4 4 4 4 4 4 9 10 No. 3 4 4 5 6 7 7 8 9 10 10 3 4 5	Trainee Beatrice Kipchumba Sandra Soy Lydia Ohlambo Lydia Ohlambo Lydia Khaemba David Tanui Dorothy Muriithi Michael Simiyu Beandr Finch Albert Panga Noel Mbashu Nelly Kibor Omar Ismail Esther Nyambura Emmanuel Mwanthi Trainee Winfred Kinuthia Erekel Kipyego Cynthia Wanjiku Grace Murage Marc Wanayeku Jared Gakera Michael Simiyu Kevin Leyian Omar Ismail Joseph Mutahi Fath Muthodi Fath Murdindi Fathe Mairuna Shammah Kiptanul Henry Taabu CharlesBengo Bob Nichabe Jack Kiruja Lucy Mukiri Martin Mwangi Yalentine Odhiambo Trainee Lucy Nyambura Henry Taabu CharlesBengo Trainee Lucy Mukiri Martin Mwangi Valentine Odhiambo
13-2	Certificate of Attendance Business Administration & Finance I, Phase 1 Business Administration & Finance II, Phase 1 Certificate of Merit Business Administration & Finance I&II, Phase 2 Business Administration & Finance I&II, Phase 2 Business Administration & Finance I, Phase 2 Certificate of Attendance	No. 1 	Trainer Trainer Trainer Rosemary Njenga Trainer Rosemary Njenga	No. No. 1 1 2 3 4 5 5 1 2 2 3 4 5 5 8 9 9 9 100 10 11 12 12 3 11 12 12 3 11 2 12 3 3 4 4 5 6 6 9 9 100 3 3 3 4 4 5 6 6 7 8 9 9 100 3 3 4 5 6 6 7 7 8 9 9 100 3 3 4	Trainee Beatrice Kipchumba Sandra Soy Lydia Ohlambo Lydia Khaemba David Tanui David Tanui Dorothy Muriithi Michael Simiyu Beardr Finch Albert Panga Noel Mbashu Nelly Kibor Omar Ismall Exther Hyambura Emmanuel Mwanthi Trainee Winfred Kinuthia Ezeklei Kipyego Cynthia Wanjiku Grace Murage Marce Wamayeku Jared Gakera Michael Simiyu Kevin Leyian Omar Ismall Joseph Mutahi Faith Mamuna Shammah Kiptanui Henry Taabu CharlesBengo Bob Nichabe Jack Kiruja Lucy Mukiri Martin Mwangi Valentine Odhiambo Trainee Lucy Mukiri Hapanna Galgallo Dorotryk yunthi Hayfanadiulahin
13-2	Certificate of Attendance Business Administration & Finance I, Phase 1 Business Administration & Finance II, Phase I Certificate of Merit Business Administration & Finance I&II, Phase 2 Business Administration & Finance I&II, Phase 2 Business Administration & Finance I, Phase 2	No. 1 2 	Trainer	No. I 1 1 2 3 3 3 4 5 5 6 6 6 6 6 7 8 8 9 9 9 9 9 13 3 11 12 2 3 3 4 5 6 6 6 6 6 6 6 6 6 7 8 9 9 9 9 10 3 3 4 5 6 6 6 6 6 7 8	Trainee Beatrice Kipchumba Sandra Soy Lydia Odhiambo Lydia Odhiambo Lydia Khaemba David Tanui Dorothy Muriithi Michael Simiyu Beanar Finch Albert Panga Noel Mbashu Nelly Kibor Omar Ismail Esther Nyambura Ermanuel Mwanthi Trainee Winfred Kinuthia Ezekiel Kipyego Oynthia Wanjiku Grace Murage Marc Wamayeku Jared Gakera Michael Simiyu Kevin Leyian Omar Ismail Doseph Mutahi Faish Muthodi Faith Mwangi Fathe Maimuna Shammah Kiptanui Henry Taabu CharlesBengo Bob Nischabe Jack Kiruja Lucy Nyambura Hapanna Gagallo Dorothy Murithi Mary Wanjiku Hanifa Abdullahi Nael Mbashu
13-2	Certificate of Attendance Business Administration & Finance I, Phase 1 Business Administration & Finance II, Phase I Certificate of Merit Business Administration & Finance I&II, Phase 2 Business Administration & Finance I&II, Phase 2 Certificate of Attendance Business Administration & Finance I, Phase 2 Business Administration & Finance I, Phase 2 Business Administration & Finance I, Phase 2	No. 11 2	Trainer Trainer Trainer Trainer Trainer Rosemary Njenga Diana Waringa Trainer Rosemary Njenga Diana Waringa	No. No. 1 1 2 3 4 4 5 5 1 2 2 3 4 4 5 6 6 6 6 6 6 6 6 6 6 6 7 7 11 1 12 13 3 3 4 4 9 9 9 100 11 12 2 3 3 4 4 5 6 6 9 9 100 3 3 4 4 5 5 6 5 6 5 5 6 7 7 7 7	Trainee Beatrice Kipchumba Sandra Soy Lydia Odhiambo Lydia Odhiambo Lydia Khaemba David Tanui Dorothy Muriithi Michael Simiyu Benard Finch Albert Panga Noel Mbashu Nelly Kibor Omar Ismail Ether Nyambura Erakel Kipyego Cynthia Wanjiku Grace Murage Michael Simiyu Kevin Legvian Omar Ismail Jared Gakera Michael Simiyu Kevin Legvian Omar Ismail Joseph Mutahi Faish Muthodi Shammah Kiptanui Henry Taabu CharlesBengo Bob Nickhabe Jack Kiruja Lucy Mukiri Martin Odhiambo Trainee Lucy Nambura Hapana Galgallo Dorothy Murithi Mary Wanjiku Hanifa Abdullahi Noel Mbashu Peninah Nyavira
13-2 13-3 13-4 13-5 13-6	Certificate of Attendance Business Administration & Finance I, Phase 1 Business Administration & Finance II, Phase 1 Certificate of Merit Business Administration & Finance I&II, Phase 2 Business Administration & Finance I&II, Phase 2 Business Administration & Finance I, Phase 2	No. 1	Trainer Trainer Trainer Trainer Rosemary Njenga Diana Waringa Trainer Rosemary Njenga Diana Waringa	No. 1 1 1 2 3 4 4 5 5 1 1 2 2 8 9 9 9 100 3 44 4 5 6 6 6 7 7 8 8 9 9 10 1 12 3 3 4 5 6 6 7 7 8 9 9 9 9 10 10	Trainee Beatrice Kipchumba Sandra Soy Lydia Odhiambo Lydia Odhiambo Lydia Odhiambo David Tanui Dorothy Muriithi Michael Simiyu Benard Finch Albert Panga Neel Mbashu Neel Mbashu Neel Mbashu Neel Mbashu Trainee Winfred Kinuthia Ezekel Kipvego Cynthia Wanjiku Grace Murage Michael Simiyu Kevin Leylan Omar Ismail Joseph Mutahi Faish Muthodi Faith Muthodi Faith Muragi Fathe Maimuna Shammah Kiptanui Henry Taabu CharlesBengo Bob Nichabe Jack Kiruja Lucy Nyambura Hapana Gagalio Dorothy Muriithi Martin Abaglia
13-2 13-3 13-4 13-5 13-6	Certificate of Attendance Business Administration & Finance I, Phase 1 Business Administration & Finance II, Phase 1 Certificate of Merit Business Administration & Finance I&II, Phase 2 Business Administration & Finance I&II, Phase 2 Business Administration & Finance I, Phase 2	No. 1 	Trainer Trainer Trainer Trainer Trainer Trainer Trainer Trainer Trainer	No. 1 2 3 4 5 1 2 3 4 5 1 2 3 4 5 6 6 7 8 9 10 12 3 4 4 4 5 6 7 8 9 10 No. 3 4 4 5 6 7 8 9 10 11 12 33 4 5 6 7 8 9 10 <	Trainee Beatrice Kipchumba Sandra Soy Lydia Ohlambo Lydia Ohlambo Lydia Chaemba David Tanui Dorothy Muriithi Michael Simiyu Beandr Finch Albert Panga Noel Mbashu Nelly Kibor Omar Ismail Esther Nyambura Esther Nyambura Esther Nyambura Erakel Kipyego Cynthia Wanjiku Grace Murage Marc Wanayeku Jared Gakera Michael Simiyu Kevin Leyian Omar Ismail Joseph Mutahi Fath Muthodi Fath Murdhali Fathe Mairnuna Shammah Kiptanul Henry Taabu CharlesBengo Bob Nichabe Jack Kiruja Lucy Mukiri Martin Mwangi Valentine Odhiambo Trainee Lucy Nyambura Henry Taabu CharlesBengo Bob Nichabe Jack Kiruja Lucy Mukiri Martin Mwangi Valentine Odhiambo Trainee Lucy Nyambura Henry Taabu CharlesBengo Bob Nichabe Jack Kiruja Lucy Mukiri Martin Mwangi Valentine Odhiambo Trainee Lucy Nyambura Henry Taabu Dorothy Muriithi Martin Mwangi Dorothy Muriithi Mary Manjiku Henry Taabu Dorothy Muriithi Neel Mbashu Peninah Nyawira Ibrahim Galo Lawrence Kiprono Beandr Finch

	Certificate of Attendance	No.	Trainee	
		1	Lucy Mukiri	
	Steam Supply Agreement Promotion Seminar I	2	Caroline Tele	
		3	Nixon Osundwa	
		4	Patrick Oyugi	
		5	Raphael Mailu	
		6	Doris Kyaka	
14.1		7	Justus Muhambi	
14-1		team supply Agreement Promotion Seminar 1	8	Yussuf Hussein
		9	David Korinko	
		10	Thomas Mburu	
		- 11	Ezekiel Kipyego	
		12	Janet Suwai	
		13	Shammah Kiptanui	
		14	Diana Lagat	

		1	Dorothy Muriithi
		2	Khalifa Said
		3	Diana Waringa
		4	Sandra Soy
		5	Moses Kachumo
		6	Michael Simiyu
		7	Esther Nyambura
		8	Joel Sutter
14-2	Steam Supply Agreement Promotion Seminar II	9	Caroline Nkatha
		10	Rose Muhia
		- 11	Charity Zeron
		12	Patrick Kaptoo
		13	Mohammed Farah
		14	Michael Sembele Keter
		15	Hillary Mwawasi
		16	Arcadius Angalwa
		17	Edwin Odum

FULL NAME			E	POSITION DEPARTMENT			
			_	Output 5 Related - Project management			
1	Michael		Simiyu	Chief Officer	Project Management		
2	Shammah		Kiptanui	Officer	Project Management		
3	Kevin		Leyian	Officer	Project Management		
4	Hassan		Abdi	Engineer	Project Management		
5	Hapanna		Galgallo	Officer	Corporate Planning & Strategy (CPS)		
	Rosemary		Njenga	Officer	Corporate Planning & Strategy (CPS)		
+	Thomas		Nivora	Chief Engineer	Drilling Operations		
	Edwin		Odum	Senior Engineer	Geothermal Resource Management (GPM)		
10	Arcadius		Angalwa	Engineer	Geothermal Resource Management (GRM)		
11	Peter	Ole	Kachuma	Engineer	Infrustructure		
12	Milka		Kairu	Chief Superitendant	Infrustructure		
13	Grace		Obonyo	Senior Legal Officer	Legal Services		
			Output 5 Related - Enviro	nmental and Social Considerations (H2S/ Noise and	Water Quality)		
1	Beatrice	Nyairo		Scientist	Environment		
2	Irene	Cheptum		Scientist	Environment		
3	Frida	Nkatha		Scientist	Environment		
4	Rose	Kiama		Scientist	Environment		
5	Frashiah	Njoroge		Scientist	Environment		
6	John	Mundui		Scientist	Environment		
7	Henry	Wamalwa		Scientist	Environment		
8	Emmah	Kashindi		Senior Technician	Environment		
9	Daniel	Loumen		Senior Technician	Environment		
- 1	A la second	<u>(</u>	Dutput 5 Related - Environment	al and Social Considerations (Environmental Manage	ement System (EMS))		
1	Anmed	Fankey Wongui	Deputy Manager	Corporate Planning & Strategy	Environment		
2	Francis	Onivo	Scientist	Environment	Environment		
4	Hockly	Simbovi	Scientist	Environment	Environment		
5	Gabriel	Wetangula	Manager	Environment	Environment		
6	David	Manyara	Scientist	Environment	Environment		
7	Rose	Kiama	Scientist	Environment	Environment		
8	Daniel	Loumen	Senior Technician	Environment	Environment		
9	Selly	Koech	Officer	Community Relations	Environment		
10	Hellen	Pembee	Officer	Community Relations	Environment		
11	Emily	Leshao	Officer	Community Relations	Environment		
12	Teresiah	Nguuri	Chief Officer	Geothermal Resource Assessment	Environment		
13	Daniel	Kilelu	Area Administrator	South Rift	Environment		
14	Allan	Njoroge	Database Administrator	Information Communication & Technology	Environment		
15	Abel	Cheloti	Performance Analyst	Corporate Performance Manangement	Environment		
16	Elisha	Omega	Engineer II	Infrustructure	Environment		
1/	Alfred	Unyango	Senior Assistant	Administration	Environment		
10	Abraham	Khaemha	Senior Engineer	Administration	Environment		
20	Elijah	Takurit	Technician	Drilling Equipment Maintenance	Environment		
_			Output 5 Related - Envir	ronmental and Social Considerations (H2S Dispersion	& Modelling)		
1	Beatrice	Nyairo		Scientist	Environment		
2	Irene	Cheptum		Scientist	Environment		
			Output 5 Related - Env	ironmental and Social Considerations (Resettlement	Action Plan)		
1	Francis	Оріуо		Scientist	Environment		
2	Hockly	Simboyi		Scientist	Environment		
3	Anne	Wangui		Scientist	Environment		
4	Henry	Wamalwa		Scientist	Environment		
5	Doreen	Nyanchoka		Assistant	Environment		
6	Lawrence	Marcharpus		Unicer Officer	Community Relations		
/	Rose	Galgallo		Unicer Legal Officer	Lorporate Planning & Strategy (CPS)		
0	Charity	Zeron		Legal Officer			
10	Michael	Simiyu		Chief Officer	Project Management		
11	Rachel	Wambui		Hospitality Attendance	Administration		
F			Output 5 Related - Env	ironmental and Social Considerations (Resettlement	Action Plan)		
1	Martha		Mburu	Manager	Direct Use		
2	Bernard		Rotich	Economist	Direct Use		
3	Japheth		Towett	Engineer	Direct Use		
4	Esther		Nyambura	Engineer	Direct Use		
5	Laura		Jemutai	Scientist	Direct Use		
6	Lawrence		Ranka	Geochemist	GRA		
7	Paul		Kiguoya	Technician	Direct Use		
8	Justus		Nyongesa	Technician	Direct Use		
9	John		Mundui	Scientist	Safety, Health & Environment (SHE)		
10	Peter		Mbia	Geologist	Geothermal Resource Assessment (GRA)		

FULL NAME		AME	POSITION	ORGANIZATION
	Module2 -	Procuremen	t: The Public Procurement Seminar (The Publi	c Procurement and Asset Disposal Act, 2015)
1	Eve	Wakhungu	Procurement Group, Supply chain	Nairobi
2	Alfred	Mbaka	Procurement Group, Supply chain	Central Rift
3	Samuel	Kimutai	Procurement Group, Supply chain	Central Rift
- 4	Nancy	Lomoto	Procurement Group, Supply chain	North Rift
5	Keddy	Jerop	Procurement Group, Supply chain	Central Rift
6	Patrick	Korir	Procurement Group, Supply chain	Nairobi
- 7	Irene	Moraa	Procurement Group, Supply chain	Nairobi
8	Oruma	Ibrahim	Procurement Group, Supply chain	Nairobi
9	Jacinta	Nasambu	Procurement Group, Supply chain	Central Rift
10	Fridah	Kinyua	Procurement Group, Supply chain	Nairobi
11	Anthony	Kithinji	Procurement Group, Supply chain	Central Rift
12	Mabel	Matama	Stores and Logistics Group, Supply chain	Central Rift
13	Joseph	Tenai	Stores and Logistics Group, Supply chain	Central Rift
14	Samuel	Wasike	Stores and Logistics Group, Supply chain	Central Rift
15	Agnes	Mwai	Stores and Logistics Group, Supply chain	Nairobi
16	Julias	M Gitangwa	Stores and Logistics Group, Supply chain	Central Rift
17	Johnstone	Kirui	Stores and Logistics Group, Supply chain	Central Rift
18	Evans	Nyamweya	Stores and Logistics Group, Supply chain	Central Rift
19	Duncun	Muiruri	Stores and Logistics Group, Supply chain	Central Rift

11 : List of Trainings in Japan and Their Participants

添付資料 11: List of Trainings in Japan and their Participants

Name	Position	Subject of training	Duration	
Kabua Geoffrey Kimani	Maintenance Technician III, Drilling Operations			
Langat Dominic Mutai Kipkemoi	Maintenance Engineer, Drilling Operations			
Mogaka Denis Onchiri	Driller I, Drilling Operations	1st training course for	2014/9/4 – 2014/10/4	
Ochieno Bartholomew Ludasia	Drilling Engineer, Drilling Operations	drilling technology		
Mwakisachi Kennedy Renson Mwaisaka	Driller I, Drilling Operations			
Makau Joseph Muema	Driller I, Drilling Operations			
Ohanya Vincent Odhiambo	Rig Maintenance Technician, Drilling Operations			
Kihonge George Ngugi	Drilling Superintendant, Drilling Operations			
Too Geoffrey Kipkoech	Rig Maintenance Technician, Drilling Operations	2nd training course for	2014/10/9 -	
Mumo Cyrus Kyalo	Drilling Engineer, Drilling Operations	drilling technology	2014/11/8	
Simyu Job	Driller I, Drilling Operations			
Njue Kurtz Mambo	Driller I, Drilling Operations			
Kipyego Ezekiel Kiptoo	Reservoir Engineer, Geothermal Resource	1st training course for		
Suwai Janet Jelagat	Senior Scientist, Geothermal Resource Management	reservoir engineering		
Angalwa Arcadius Muhanji	Senior Scientist, Geothermal Resource Management		2014/10/13 - 2014/11/1	
Mwawasi Hilary Raphael Mwangeka	Senior Scientist, Geothermal Resource Management	2nd training course for	2011/11/1	
Sembele Michael Kipkoech Keter	Senior Scientist, Geothermal Resource Management	reservoir engineering		
WANYAMA Pascal Wesonga	Senior Driller, Geothermal Drilling Department			
ERNEST Cheruiyot Malel	Senior Driller, Geothermal Drilling Department			
PETER Mbakwa Mutahi	Driller, Geothermal Drilling Department	3rd training course for		
KIPKURUI Kibor	Driller, Geothermal Drilling Department	drilling technology	2015/7/2~2015/8/1	
PETER Muchendu Mburu	Driller, Geothermal Drilling Department			
BERNARD Ngihe Mbaluka	Senior Driller, Geothermal Drilling Department			
MURUNGI Lawrence Majau	Senior Engineer Cementing, Geothermal Drilling			
MOHAMED Abdirashid Muktar	Technician I Cementing, Geothermal Drilling			
	Department	Ath training course for	2015 /8 /20 -	
	Senior Driller, Geothermal Drilling Department	drilling technology	2015/8/20~	
	langet			
	Senior Driller, Geothermal Drilling Department			
	Dhier, Geothermai Dhiing Department			
Suwai lanet lelagat	Senior Scientist, Geothermal Resource Management			
Kinyego Ezekiel Kintoo	Reservoir Engineer, Geothermal Resource			
Angelue Areadius Muhanii	Management Reservoir Engineer. Geothermal Resource	3rd training course for reservoir engineering	2015/6/30 – 2015/8/7	
	Management Reconveir Engineer Coethermal Recourse		2013/0//	
Mwawasi Hilary Raphael Mwangeka	Management			
Suwai Janet Jelagat	Chief Scientist, Geothermal Resource Management			
Mwawasi Hilary Raphael Mwangeka	Reservoir Engineer, Geothermal Resource Management			
Olando David Awori	Reservoir Engineer, Geothermal Resource	1-t Decembra Frazina anima	2016/0/10	
Onvango Stephen Odhiambo	Reservoir Engineer, Geothermal Resource	Phase 2	2016/10/29	
Shikanga Philin Burudi	Management Reservoir Engineer, Geothermal Resource			
	Management Reservoir Engineer Geothermal Resource			
Ayonga Joel Nyariki	Management			
KINETTO Charles Kinkomai	Conservations Tankasisian Deilling Operanticas			
	Driller, Drilling Operations			
	Planning & Logistics Technician. Drilling Planning &			
	Logistics	5th training course for drilling technology	2016/8/23 - 2016/9/22	
WANYONYI Eric Wekesa	Driller, Drilling Operations	unning teenhology	2010/5/22	
MATHENGE Phyillis Gathoni	Engineer III, Drilling Operations			
	Technician, Drilling Operations			
Keny Fred Spencer	Drilling Engineer, Drilling Operations			
Musalia Doughty Alunga	Drilling Engineer, Drilling Operations			
Petu John Mrima	Cementing Technician, Drilling Operations	6th training course for	2016/10/12 -	
Lepapa Stephen Lesnao	Maintenance	drilling technology	2016/11/10	
Kiprono Paul Kimutai	Planning & Logistics Technician Drilling Operations			
		746 4	2017/0//-	
Michael Kamau Mungai	Drilling Engineer, Drilling Operations	<pre>/tn training course for drilling technology</pre>	2017/9/17 - 2017/10/19	

Joseph W. Muyundo	Drilling Engineer, Drilling Operations			
Dennis Barkebo Chepchieng	Drilling Engineer, Drilling Operations			
Martin Kibiwott Rotich	Drilling Engineer, Drilling Operations	7th training course for drilling technology	2017/9/17 - 2017/10/19	
Alois Cherop Kipchirchir	Drilling Engineer, Drilling Operations			
Daniel Mbugua Ndichu	Driller, Drilling Operations			
Joel Rutto Sutter	Drilling Engineer, Drilling Operations			
Elkana Kipchirchir Sogomo	Drilling Engineer, Drilling Operations			
Geoffrey Kipkoech Sigei	Drilling Engineer, Drilling Operations	8th training course for	2017/10/16 -	
Francis Kinga Wanjohi	Drilling Engineer, Drilling Operations	drilling technology	2017/11/17	
Simon Gichuhi Njuguna	Drilling Engineer, Drilling Operations			
Emmanuel Mutaki Kundu	Driller, Drilling Operations			
Mwakirani Raymond Delmas	Geophysicist, Geothermal Resource Assessment		2019/7/18 – 2019/8/2	
Lopeyok Tito Plimo	Geologist, Geothermal Resource Assessment			
Muslusa George Igunza	Geochemist, Geothermal Resource Assessment			
Wamalwa Antony	Deputy Manager, Geothermal Resource Assessment	Conceptual Modeling Seminar		
Njue Lucy Muthoni	Senior Geologist, Geothermal Resource Assessment			
Jeremiah Kipngok	Geochemist, Geothermal Resource Assessment			
Mohamud Yussuf Noor	Geophysicist, Geothermal Resource Assessment			
Mwawasi Hilary Raphael Mwangeka	Reservoir Engineer, Geothermal Resource Management			
Moses Chemeitoi Kilimo	Reservoir Engineer, Geothermal Resource Management			
David Awori Olando	Reservoir Engineer, Geothermal Resource Management	Reservoir Engineering	2019/6/18 –	
Joel Nyariki Ayonga	Reservoir Engineer, Geothermal Resource Management	Seminar	2019/8/2	
Philip Burudi Shikanga	Reservoir Engineer, Geothermal Resource Management			
Stephen Odhiambo Onyango	Reservoir Engineer, Geothermal Resource Management			

12 : List of Products (Handbook, Visual Aid and Software)

添付資料 12: List of Products (Handbooks, Visual Aids and Software) List of Handbooks

*Note: Column highlighted in yellow is under construction

Theme	pages
Geoscience	
GEOLOGY	103
HANDBOOK GEOCHEMICAL DATA ANALYSIS AND INTERPREPATION	80
HANDBOOK FOR SAMPLING, CHEMICAL ANALYSIS AND QUALITY CONTROL	86
HANDBOOK FOR MT(3D)/TEM DATA ANALYSIS AND INTERPRETATION	63
HANDBOOK GRAVITY	56
HANDBOOK ON MICROEARTHQUAKE DATA PREPARATION AND ANALYSIS IN THE GEOTHERMAL FIELD	66
CONCEPTUAL MODELING AND WELL SITING	53
Drilling	
HANDBOOK FOR DRILLING OPERATION	426
APPENDIX : 1 CLASS ROOM SESSION HANDOUTS VOLUME 1	630
APPENDIX : 1 CLASS ROOM SESSION HANDOUTS VOLUME 2	554
APPENDIX : 1 CLASS ROOM SESSION HANDOUTS VOLUME 3	448
APPENDIX : 1 CLASS ROOM SESSION HANDOUTS VOLUME 4	472
RIG BULLETINS	123
HANDBOOK FOR DRILLING FLUIDS	114
HANDBOOK FOR PLASMA ARC CUTTING	48
HANDBOOK FOR DRILLING HSE PUTTING 5S INTO ACTION	182
HANDBOOK FOR DRILLING EQUIPMENT MAINTENANCE	289
HANDBOOK FOR DRILLING ASSET MANAGEMENT	52
HANDBOOK FOR THE MANAGEMENT TRAINING	56
Reservoir Evaluation	
HANDBOOK FOR WELL TESTING	38
WELL LOGGING HANDBOOK FOR GDC	21
HANDBOOK FOR RESERVOIR EVALUATION	28
HANDBOOK for CONSTRUCTION OF GEOTHERMAL DATABASE MANAGEMENT SYSTEM	168
Environment, Plant Engineering, Corporate/Project Management, Steam Supply Agreement	
HANDBOOK FOR IMPLEMENTING ENVIRONMENTAL AND SOCIAL SAFEGUARDS	77
FOR GEOTHERMAL POWER PROJECTS, GDC	//
ENVIRONMENTAL MONITORING HANDBOOK HYDROGEN SULPHIDE, NOISE AND WATER QUALITY	78
HANDBOOK ON GEOTHERMAL POWER PLANT ENGINEERING	239
HANDBOOK ON EVALUATION of NATURAL DISASTER RISK	118
HANDBOOK ON STEAM SUPPLY AGREEMENT PROMOTION	178
PARTNERSHIP WITH POWER UTILITIES	1/0
HANDBOOK ON BUSINESS ADMINISTRATION AND FINANCIAL ANALYSIS	137
HANDBOOK ON MANAGEMENT STRATEGY AND BUSINESS PLANNING	99
HANDBOOK ON PROJECT MANAGEMENT	77
HANDBOOK ON INTERNAL CONTROL AND RISK ASSESSMENT	308
Economic Evaluation	
HANDBOOK FOR ECONOMIC EVALUATION OF PROJECT	399
LECTURE MATERIALS FOR ECONOMIC EVALUATION OF PROJECT	414
HANDBOOK FOR CREATING A FINANCIAL MODEL (VOLUME I)	92
LECTURE MATERIALS FOR CREATING A FINANCIAL MODEL (VOLUME I)	136
HANDBOOK FOR CREATING A FINANCIAL MODEL (VOLUME II)	143
LECTURE MATERIALS FOR CREATING A FINANCIAL MODEL (VOLUME II)	184
HANDBOOK FOR CREATING A FINANCIAL MODEL (EXCEL VBA BASICS)	83
LECTURE MATERIALS FOR CREATING A FINANCIAL MODEL (EXCEL VBA BASICS)	83
Geothermal Direct Use	
HANDBOOK FOR DIRECT USE OF GEOTHERMAL ENERGY	64

Content of the Visual Training Support Materials Volume 1: Visual Training Aid (under construction)

	List of To	pics for Drilling Lecture Video	Video Type
1	Basic Concepts of Geothermal Drilling		Lecture Video
2	Development of an Equipment Register		Lecture Video
3	Development of an Integrity and Reliabilit	y Maintenance Plan	Lecture Video
4	Knowing Your Rigs		Lecture Video
5	Machine Elements Clutches		Lecture Video
6	Machine Elements Shaft Coupling		Lecture Video
7	Machine Elements Gears		Lecture Video
8	Machine Elements Journal Bearings		Lecture Video
9	Machine Elements Rig Brakes		Lecture Video
10	Machine Elements Roller Bearings		Lecture Video
11	Machine Elements Roller Chain		Lecture Video
12	Machine Elements Shafts		Lecture Video
13	Machine Elements Sheaves		Lecture Video
14	Practical Rig Operations		Lecture Video
15	Drawworks - Preventive Maintenance - In	spection - Reconditioning	Lecture Video
16	Drawworks Operations		Lecture Video
17	Wire Rope, Drilling Line and Accessories		Lecture Video
18	Top Drive System Operations		Lecture Video
19	Mast API RP 4G Inspection		Lecture Video
20	Substructure API RP 4G Inspection		Lecture Video
21	Traveling and Crown Block Preventive Ma	ntenance – Inspection - Reconditioning	Lecture Video
22	Drill Bits		Lecture Video
23	Drilling Tubulars		Lecture Video
24	Drilling Rig Rotating System- Operations		Lecture Video
25	Rotary Kelly Bushing		Lecture Video
26	Rotary Swivel		Lecture Video
27	Rotary Table		Lecture Video
28	Overpull Margin Explanation		Discussion Video
29	Basics of Drilling Fluids		Lecture Video
30	Mud Mixing (Demonstration by Telnite M	ud Engineer)	Demonstration Video
31	Mud Tanks and Mud Cycle		Lecture Video
32	Mud Pumps Operation, Fluid End Preventi	ve Maintenance – Inspection - Reconditioning	Lecture Video
33	Mud Pump - Power End Preventive Mainte	enance – Inspection - Reconditioning	Lecture Video
	Solid Control System: Shale Shaker Preven	tive Maintenance – Inspection - Reconditioning Desander - Desilter - Preventive Maintenance – Inspection -	
34	Reconditioning	Degasser - Preventive Maintenance – Inspection - Reconditioning Centrifugal Pump - Preventive Maintenance – Inspection -	Lecture Video
	Reconditioning		
25	Electric Motor DNA Inspection and Deser	Cooling Tower - Preventive Maintenance – Inspection - Reconditioning	Locturo Video
35	Electric Motor PM, Inspection and Recond	ltioning	Lecture Video
27	Euglise PM, hispection and Recon		Lecture Video
37	Conceptor DM Inconstion and Decon		Lecture Video
30 20	Intro Pig Dowor Systems		Lecture Video
39	CCB Systems		Lecture Video
40	Son Systems		Lecture Video
41			
42			Lecture Video
43	Confined Space Entry		
44	Working at Hoights		
45 AC			
40	Everyation		Lecture Video
4/ /9	How ThermaPrime Managos HCE		Discussion Video
+0	How Hiermarillie Mallages FSE		

Volume 2: GDC's Corporate Advertisement for the International Event Display (under construction)

Software for the Database Training= 180 Mbyte1Set of software code written by Eclipse(32 bits) for database training= 180 Mbyte2Set of software code written by Eclipse(64 bits) for database training= 180 Mbyte3Set of software code written by Laravel (Web-Based Database Management GUI) for database training~487 kbyte4Set of software code written by XAMPP(free and open-source cross-platform web server solution stack package)~505 Mbyte5Set of utility software code written for operating GDMANAGER~509 Mbyte6Set of application software related to Composer, JavaRuntimeEnvironment and Postgresql~206 Mbyte7Set of utility software related to the database training~6.26 Gbyte8Software for the Economic Evaluation Training~6.26 Gbyte1Macro_Basics_(ver2.0).xlsm34 Kbyte2WJ_Geo_PriceModel_(ver10.1).xlsm812 Kbyte3Finance_Training_for_GDC(ver2.2rev20180126).xlsx281 Kbyte4VBA_Basics_GDC2018(ver1.0).xlsm323 Kbyte5Financial_Model_for_GDC_waro_Training2018.xlsm3,759 Kbyte6Financial_Model_for_GDC_Simple_Model(ver2.0).xlsx213 Kbyte8Finance_Training2_for_GDC_Eull_Model(ver2.0).xlsx568 Kbyte		List of Software produced under the project	size
1Set of software code written by Eclipse(32 bits) for database training= 180 Mbyte2Set of software code written by Eclipse(64 bits) for database training= 180 Mbyte3Set of software code written by Laravel (Web-Based Database Management GUI) for database training~487 kbyte4Set of software code written by XAMPP(free and open-source cross-platform web server solution stack package)~505 Mbyte5Set of application software code written for operating GDMANAGER~59 Mbyte6Set of application software related to Composer, JavaRuntimeEnvironment and Postgresql~206 Mbyte7Set of utility software related to the database training~6.26 GbyteSoftware for the Economic Evaluation Training1Macro_Basics_(ver2.0).xlsm34 Kbyte2WJ_Geo_PriceModel_(ver10.1).xlsm812 Kbyte3Finance_Training_for_GDC(ver2.2rev20180126).xlsx281 Kbyte4VBA_Basics_GDC2018(ver1.0).xlsm323 Kbyte5Financial_Model_for_GDC(ver2.0).xlsm39 Kbyte6Financial_Model_for_GDC_Macro_Training2018.xlsm3,759 Kbyte7Finance_Training_for_GDC_Simple_Model(ver2.0).xlsx213 Kbyte8Finance_Training2_for_GDC_Full_Model(ver2.0).xlsx568 Kbyte		Software for the Database Training	= 180 Mbyte
2Set of software code written by Eclipse(64 bits) for database training= 180 Mbyte3Set of software code written by Laravel (Web-Based Database Management GUI) for database training~487 kbyte4Set of software code written by XAMPP(free and open-source cross-platform web server solution stack package)~505 Mbyte5Set of utility software code written for operating GDMANAGER~59 Mbyte6Set of application software related to Composer, JavaRuntimeEnvironment and Postgresql~206 Mbyte7Set of utility software related to the database training~6.26 GbyteSoftware for the Economic Evaluation Training1Macro_Basics_(ver2.0).xlsm34 Kbyte2WJ_Geo_PriceModel_(ver10.1).xlsm812 Kbyte3Finance_Training_for_GDC(ver2.2rev20180126).xlsx281 Kbyte4VBA_Basics_GDC2018(ver1.0).xlsm323 Kbyte5Financial_Model_for_GDC(ver2.0).xlsm39 Kbyte6Financial_Model_for_GDC_Macro_Training2018.xlsm3,759 Kbyte7Finance_Training2_for_GDC_Simple_Model(ver2.0).xlsx213 Kbyte8Finance_Training2_for_GDC_Full_Model(ver2.0).xlsx568 Kbyte	1	Set of software code written by Eclipse(32 bits) for database training	= 180 Mbyte
3Set of software code written by Laravel (Web-Based Database Management GUI) for database training~487 kbyte4Set of software code written by XAMPP(free and open-source cross-platform web server solution stack package)~505 Mbyte5Set of utility software code written for operating GDMANAGER~59 Mbyte6Set of application software related to Composer, JavaRuntimeEnvironment and Postgresql~206 Mbyte7Set of utility software related to the database training~6.26 GbyteSoftware for the Economic Evaluation Training1Macro_Basics_(ver2.0).xlsm34 Kbyte2WJ_Geo_PriceModel_(ver10.1).xlsm34 Kbyte3Finance_Training_for_GDC(ver2.2rev20180126).xlsx281 Kbyte4VBA_Basics_GDC2018(ver1.0).xlsm323 Kbyte5Financial_Model_for_GDC(ver2.0).xlsm3759 Kbyte6Financial_Model_for_GDC_Macro_Training2018.xlsm3,759 Kbyte7Finance_Training_for_GDC_Simple_Model(ver2.0).xlsx213 Kbyte8Finance_Training_for_GDC_Full_Model(ver2.0).xlsx568 Kbyte	2	Set of software code written by Eclipse(64 bits) for database training	= 180 Mbyte
4Set of software code written by XAMPP(free and open-source cross-platform web server solution stack package)~505 Mbyte5Set of utility software code written for operating GDMANAGER~59 Mbyte6Set of application software related to Composer, JavaRuntimeEnvironment and Postgresql~206 Mbyte7Set of utility software related to the database training~6.26 Gbyte7Software for the Economic Evaluation Training700 Mbyte1Macro_Basics_(ver2.0).xlsm34 Kbyte2WJ_Geo_PriceModel_(ver10.1).xlsm812 Kbyte3Finance_Training_for_GDC(ver2.2rev20180126).xlsx281 Kbyte4VBA_Basics_GDC2018(ver1.0).xlsm323 Kbyte5Financial_Model_for_GDC(ver2.0).xlsm39 Kbyte6Financial_Model_for_GDC_Macro_Training2018.xlsm3,759 Kbyte7Finance_Training2_for_GDC_Simple_Model(ver2.0).xlsx213 Kbyte8Finance_Training2_for_GDC_Full_Model(ver2.0).xlsx568 Kbyte	3	Set of software code written by Laravel (Web-Based Database Management GUI) for database training	~487 kbyte
5Set of utility software code written for operating GDMANAGER~59 Mbyte6Set of application software related to Composer, JavaRuntimeEnvironment and Postgresql~206 Mbyte7Set of utility software related to the database training~6.26 GbyteSoftware for the Economic Evaluation Training1Macro_Basics_(ver2.0).xlsm34 Kbyte2WJ_Geo_PriceModel_(ver10.1).xlsm812 Kbyte3Finance_Training_for_GDC(ver2.2rev20180126).xlsx281 Kbyte4VBA_Basics_GDC2018(ver1.0).xlsm323 Kbyte5Financial_Model_for_GDC(ver2.0).xlsm39 Kbyte6Financial_Model_for_GDC_Macro_Training2018.xlsm3,759 Kbyte7Finance_Training2_for_GDC_Simple_Model(ver2.0).xlsx213 Kbyte8Finance_Training2_for_GDC_Full_Model(ver2.0).xlsx568 Kbyte	4	Set of software code written by XAMPP(free and open-source cross-platform web server solution stack package)	~505 Mbyte
6Set of application software related to Composer, JavaRuntimeEnvironment and Postgresql~206 Mbyte7Set of utility software related to the database training~6.26 Gbyte7Software for the Economic Evaluation Training34 Kbyte1Macro_Basics_(ver2.0).xlsm34 Kbyte2WJ_Geo_PriceModel_(ver10.1).xlsm812 Kbyte3Finance_Training_for_GDC(ver2.2rev20180126).xlsx281 Kbyte4VBA_Basics_GDC2018(ver1.0).xlsm323 Kbyte5Financial_Model_for_GDC(ver2.0).xlsm39 Kbyte6Financial_Model_for_GDC_Macro_Training2018.xlsm3,759 Kbyte7Finance_Training2_for_GDC_Simple_Model(ver2.0).xlsx213 Kbyte8Finance_Training2_for_GDC_Full_Model(ver2.0).xlsx568 Kbyte	5	Set of utility software code written for operating GDMANAGER	~59 Mbyte
7Set of utility software related to the database training~6.26 GbyteSoftware for the Economic Evaluation Training1Macro_Basics_(ver2.0).xlsm34 Kbyte2WJ_Geo_PriceModel_(ver10.1).xlsm812 Kbyte3Finance_Training_for_GDC(ver2.2rev20180126).xlsx281 Kbyte4VBA_Basics_GDC2018(ver1.0).xlsm323 Kbyte5Financial_Model_for_GDC(ver2.0).xlsm39 Kbyte6Financial_Model_for_GDC_Macro_Training2018.xlsm3,759 Kbyte7Finance_Training2_for_GDC_Simple_Model(ver2.0).xlsx213 Kbyte8Finance_Training2_for_GDC_Full_Model(ver2.0).xlsx568 Kbyte	6	Set of application software related to Composer, JavaRuntimeEnvironment and Postgresql	~206 Mbyte
Software for the Economic Evaluation Training1Macro_Basics_(ver2.0).xlsm34 Kbyte2WJ_Geo_PriceModel_(ver10.1).xlsm812 Kbyte3Finance_Training_for_GDC(ver2.2rev20180126).xlsx281 Kbyte4VBA_Basics_GDC2018(ver1.0).xlsm323 Kbyte5Financial_Model_for_GDC(ver2.0).xlsm39 Kbyte6Financial_Model_for_GDC_Macro_Training2018.xlsm3,759 Kbyte7Finance_Training2_for_GDC_Simple_Model(ver2.0).xlsx213 Kbyte8Finance_Training2_for_GDC_Full_Model(ver2.0).xlsx568 Kbyte	7	Set of utility software related to the database training	~6.26 Gbyte
1Macro_Basics_(ver2.0).xlsm34 Kbyte2WJ_Geo_PriceModel_(ver10.1).xlsm812 Kbyte3Finance_Training_for_GDC(ver2.2rev20180126).xlsx281 Kbyte4VBA_Basics_GDC2018(ver1.0).xlsm323 Kbyte5Financial_Model_for_GDC(ver2.0).xlsm39 Kbyte6Financial_Model_for_GDC_Macro_Training2018.xlsm3,759 Kbyte7Finance_Training2_for_GDC_Simple_Model(ver2.0).xlsx213 Kbyte8Finance_Training2_for_GDC_Full_Model(ver2.0).xlsx568 Kbyte		Software for the Economic Evaluation Training	
2WJ_Geo_PriceModel_(ver10.1).xlsm812 Kbyte3Finance_Training_for_GDC(ver2.2rev20180126).xlsx281 Kbyte4VBA_Basics_GDC2018(ver1.0).xlsm323 Kbyte5Financial_Model_for_GDC(ver2.0).xlsm39 Kbyte6Financial_Model_for_GDC_Macro_Training2018.xlsm3,759 Kbyte7Finance_Training2_for_GDC_Simple_Model(ver2.0).xlsx213 Kbyte8Finance_Training2_for_GDC_Full_Model(ver2.0).xlsx568 Kbyte	1	Macro_Basics_(ver2.0).xlsm	34 Kbyte
3Finance_Training_for_GDC(ver2.2rev20180126).xlsx281 Kbyte4VBA_Basics_GDC2018(ver1.0).xlsm323 Kbyte5Financial_Model_for_GDC(ver2.0).xlsm39 Kbyte6Financial_Model_for_GDC_Macro_Training2018.xlsm3,759 Kbyte7Finance_Training2_for_GDC_Simple_Model(ver2.0).xlsx213 Kbyte8Finance_Training2_for_GDC_Full_Model(ver2.0).xlsx568 Kbyte	2	WJ_Geo_PriceModel_(ver10.1).xlsm	812 Kbyte
4VBA_Basics_GDC2018(ver1.0).xlsm323 Kbyte5Financial_Model_for_GDC(ver2.0).xlsm39 Kbyte6Financial_Model_for_GDC_Macro_Training2018.xlsm3,759 Kbyte7Finance_Training2_for_GDC_Simple_Model(ver2.0).xlsx213 Kbyte8Finance_Training2_for_GDC_Full_Model(ver2.0).xlsx568 Kbyte	3	Finance_Training_for_GDC(ver2.2rev20180126).xlsx	281 Kbyte
5Financial_Model_for_GDC(ver2.0).xlsm39 Kbyte6Financial_Model_for_GDC_Macro_Training2018.xlsm3,759 Kbyte7Finance_Training2_for_GDC_Simple_Model(ver2.0).xlsx213 Kbyte8Finance_Training2_for_GDC_Full_Model(ver2.0).xlsx568 Kbyte	4	VBA_Basics_GDC2018(ver1.0).xlsm	323 Kbyte
6Financial_Model_for_GDC_Macro_Training2018.xlsm3,759 Kbyte7Finance_Training2_for_GDC_Simple_Model(ver2.0).xlsx213 Kbyte8Finance_Training2_for_GDC_Full_Model(ver2.0).xlsx568 Kbyte	5	Financial_Model_for_GDC(ver2.0).xlsm	39 Kbyte
7Finance_Training2_for_GDC_Simple_Model(ver2.0).xlsx213 Kbyte8Finance_Training2_for_GDC_Full_Model(ver2.0).xlsx568 Kbyte	6	Financial_Model_for_GDC_Macro_Training2018.xlsm	3,759 Kbyte
8 Finance_Training2_for_GDC_Full_Model(ver2.0).xlsx 568 Kbyte	7	Finance_Training2_for_GDC_Simple_Model(ver2.0).xlsx	213 Kbyte
	8	Finance_Training2_for_GDC_Full_Model(ver2.0).xlsx	568 Kbyte

13: List of Donation Equipment

添付資料 13: List of Donated Equipment

JFY 2014 (Kenya Shilling)

	÷.			
11,926,419	Item	Unit Amount	Unit	Cost
February 28, 2015	Software Starter 4 (Golden Software)	66,923.37	3 Units	200,770.11
February 28, 2015	Software Voxler 3 (Golden Software)	63,173.07	5 Units	315,865.35
February 28, 2015	Software Global Mapper v15.2 (Blue Marble)	55,898.10	2 Units	117,796.20
February 28, 2015	Software Adobe Photoshop CS	44,423.10	1 Unit	44,423.10
February 28, 2015	Software MATLAB (Mathworks)	434,606.04	3 Units	1,303,818.12
February 28, 2015	Software Weerachai Siripunvaraporn's WS3DINVMT	3,246,933.07	1Unit	3,246,933.07
February 28, 2015	Software Reftek Interface (Trimble)	263,846.16	3 Units	791,538.48
February 28, 2015	Software Reftek COMPASS (Trimble)	163,846.17	3 Units	491,538.51
February 28, 2015	Software Wellsim (Gradient Geodata)	1,656,923.04	1 Unit	1,656,923.04
February 28, 2015	Software T2Pre/post (Edit)	536,303.07	1 Unit	536,303.07
February 28, 2015	Software TOUGH2 CORE (Lawrence Berkeley Laboratory)	562,013.37	1 Unit	562,013.37
February 28, 2015	HP Workstation Computer	308,423.07	1 Unit	308,423.07
February 28, 2015	Software AEROMOD View (Lakes Environmental)	206,798.04	1 Unit	206,798.04
March 30, 2015	Ultrasonic Bath (Daihan)	58,000.00	1 Unit	58,000.00
March 30, 2015	Centrifuge with Accessories (Hettich)	446,195.00	1 Unit	446,195.00
March 30, 2015	Gas Chromatograph with Accessories (Shimadzu)	1,639,080.00	1 Unit	1,639,080.00
Total (Shilling)				11,926,418.53

JFY 2015 (Kenya Shilling)

Date	Item	Unit Amount	Unit	Cost
October 16, 2015	Software RIM Base (Infosat system)	857,770.42	12 Units	10,293,245.08
October 16, 2015	Mud Test Kit (Fann Instrument)	1,187,332.79	1 Unit	1,187,332.79
October 16, 2015	Cutting Machine (Miller)	843,287.23	2 Units	1,686,574.47
October 16, 2015	Gas Monitoring Unit (Riken Keiki)	47,757.37	21 Units	1,002,904.71
October 16, 2015	Rotary Slip with Accessories (Dencon)	593,302.05	4 Units	2,373,208.20
January 22, 2016	Tong (BVM)	1,094,520.08	6 Units	13,134,240.90
October 16, 2015	Safety Clamp (Dencon)	519,135.66	4 Units	2,076,542.63
October 16, 2015	Casing Pipe Tong with Belt (Gearench)	1,707,020.42	2 Units	3,414,040.84
Total (Shilling)				35,168,089.62

JFY2014-2015 Hand Carried Equipment (Japanese Yen)

Date	ITEM	Unit Amount	Unit	Cost
	Funnel 150mm×1.5mm	¥44,000	2	¥88,000
	Funnel 300mm×1.6mm	¥66,000	1	¥66,000
	Tube 1000mm	¥73,000	1	¥73,000
	Tube 500mm	¥48,000	2	¥96,000
	Connector 50mm	¥15,000	4	¥60,000
	Elbow	¥66,000	1	¥66,000
	Teflon Tube 6mm×8mm	¥30,000	1	¥30,000
	Silicon Tube 8mm×10mm	¥6,000	2	¥12,000
April 23, 2014	Aster LB-1 Sat-Image	¥107,800	1	¥107,800
March 18, 2015	Band-it-tool	¥41,850	1	¥41,850
	Total			¥640,650

JFY 2016 (USD)

Date	Item	Unit Amount	Unit	Cost
November 28, 2016	Software (ISC- AERMOD View Version9.1, Lake Environmental)	1,700.00	2 Units	3,400.00
March 29, 2017	Toxic Gas Analyser (JEROME J605, Arizona Instrument)	21,960.00	2 Units	43,920.00
March 29, 2017	Water Analyser (YSI ProDSS)	9,931.00	1 Units	9,931.00
March 29, 2017	Sound Meter (RION, NL-42)	6,945.00	2 Units	13,890.00
March 1, 2017	Lug Jaw (pipe size 4 to 5-1/4inches) (BVM No.1372)	1,460.00	12 Units	17,520.00
March 1, 2017	Lug Jaw (pipe size 5 to 7-1/4inches) (BVM No.1373)	1,645.00	12 Units	19,740.00
March 1, 2017	Lug Jaw (pipe size 6-7/8 to 8-5/8inches) (BVM No.1374)	1,695.00	12 Units	20,340.00
Total (US\$)				128,741.00

JFY 2017 (Kenya Shilling)

Date	Item	Unit Amount	Unit	Cost
January 13, 2018	pH Liquid	1,113.60	12 Units	13,363.20
March 21, 2018	Alkaline Agent (Caustic Soda)	138.00	8600kg	1,186,800.00
March 21, 2018	Flocculant (Rhino Lime)	28.00	1000kg	28,000.00
March 21, 2018	Sodium Bicarbonate (Sodium Bicarbonate)	56.00	2000kg	112,000.00
	Transport Cost for 3 Items Above			75,000.00
Total (Shilling)				1,415,163.20

JFY 2017 (USD)

Date	Item	Unit Amount	Unit	Cost
March 24, 2018	Viscosifier (TEL-POLYMER H)	223.61	400pack	89,443.00
March 24, 2018	Dispersant (G-500S, TELNITE)	276.62	75pack	20,747.00
March 24, 2018	Dispersant (TELNITE BX, TELNITE)	71.46	295pack	21,081.00
March 24, 2018	Deformer (Deformer No.15, TELNITE)	130.94	66pack	8,642.00
March 24, 2018	Viscosifier & Lubricant (EASY DRILL, TELNITE)	323.65	165pack	53,403.00
March 24, 2018	Forming Agent (TELFORMER 23L, TELNITE)	95,44	445pack	42,469.00
	Cargo Handling Pallets			846.00
	Freight, Transport, Insurance			41,346.00
Total (US\$)				277,977.00

JFY 2017 (Japanese Yen)

Date	Item	Unit Amount	Unit	Cost
April 20, 2017	FCRS Simulation Software	411,900.00	1 Set	411,900
March 20, 2018	Extended Function Program	64,000.00	2 Units	128,000
Total (Yen)				539,900.00

Hand Carried Equipment (Japanese Yen)

Date	ITEM	Unit Amount	Unit	Cost
	pH/ORP Sensors	¥40,000	1 Set	¥40,000
Total (Yen)				¥40,000

JFY 2018 (Kenya Shilling)

Date	Item	Unit Amount	Unit	Cost				
	Safety equipment							
	Goggles	348.00	24 Units	8,352.00				
	Chemical Gloves	440.80	24 Sets	10,579.00				
August 4, 2018	Chemical Apron	522.00	24 Units	12,528.00				
	Face Shield	4,060.00	6 Units	24,360.00				
	Dust Mask	116.00	200 Units	23,200.00				
	Potable Eye Washer	75,000.00	2 Units	150,000.00				
	Chemi	cals						
	Sulphuric Acid	1,299.28	1 Unit	1,299.28				
	Phenolphthalein (indicator)	609.00	1 Unit	609.00				
	Phenolphthalein (solution)	438.48	1 Unit	438.48				
	Silver Nitrate	5,115.60	1 Unit	5,115.60				
	Potassium Chromate	2,046.24	1 Unit	2,046.24				
August 4, 2018	Sodium Hydroxide Pellets	552.16	1 Unit	552.16				
	Edta Disodium Salt	535.92	1 Unit	535.92				
	Hydrogen Peroxide	625.24	1 Unit	625.24				
	Methylene Blue (powder)	276.08	1 Unit	276.08				
	Methylene Blue (solution)	633.36	1 Unit	633.36				
	Eriochrome Black T	584.64	1 Unit	584.64				
	Buffer Solution	4,292.00	3 Units	12,876.00				
Total (Shilling)				230,318.28				

JFY 2018 (USD)

Date	Item	Unit Amount	Unit	Cost
October 12, 2018	Mud Pump Sets (NKZ3-D6, TURUMI PUMP)	10,989.75	4 sets	43,959.00
October 12, 2018	Cabtyre Cable (30m) (TOTAKU)	2,063.00	4 Units	8,251.00
October 21, 2018	Hoses Line Ace (Dia.150mm/20m) (TOTAKU)	4,691.50	4 Units	18,766.00
October 12, 2018	S-Color Nipple (150mm) (TOTAKU)	182.55	4 Units	730.00
October 12, 2018	Power Band (150mm) (TOTAKU)	50.19	16 Units	803.00
October 12, 2018 Hose Reducer (100 x 150mm, S-Color/Both sides) (TOTAKU)		127.75	4 Units	511.00
October 13, 2018	13, 2018 Victauric Joint S Type (100mm) (Victauric)		4 Units	331.00
October 13, 2018	Victauric Joint S Type (150mm) (Victauric)	164.90	10 Units	1,649.00
Total (Shilling)				75,000.00

JFY 2018 (Japanese Yen)

Date	Item	Unit Amount	Unit	Cost
July 20, 2018	LiDAR Data	574,074	1 Set	574,074
August 16, 2018	WellSim Perpetual License - Single User	148,124.00	1 Set	148,124
Total (Yen)				722,198.00

Hand Carried Equipment (Japanese Yen)

Date	ITEM	Unit Amount	Unit	Cost
	Wireline Pa	arts		
	Cablehead Boot	¥1,056	5 Units	¥5,281
	Fishing Neck	¥11,164	1 Unit	¥11,164
	Rope Socket Cone	¥2,641	2 Units	¥5,282
	Contact Sub Assembly	¥8,283	2 Units	¥16,567
	Shipping Costs (USA-JPN)	¥16,730	1 Unit	¥16,730
	Total			¥55,023

14 : O&M status of Donated Equipment (GRA, GRM and Environment related)

Category	Name of goods	Manufacturer	Model	Qty	Procuring Agent	Remark (GRA, GRM, Environment)	Plan for a Periodical Maintenance (Cost, frequency, schedule)	
	Software	Golden Software	Starter 4	3		GRA	N/A	
	Software	Golden Software	Voxler 3	5		GRA	N/A	
	Software	Blue Marble Geographic	Global Mapper v15.2	2	-	GRA	N/A	
	Software	Adobe The MatWorks	Adobe Systems Photoshop CS	3		GRA	Annual subscription fee 20,000Ksh/year Additional Lisence (4 000 US\$) for next year	
	Software	Dr. Weerachai Siripunvaraporn's	WS3DINVMT	1	-	GRA	N/A	
	Software	Trimble	RefTek Interface ver 3.0	3		GRA	N/A	
	Software	Trimble	RefTek COMPASS	3		GRA	N/A	
	Software	Gradient GeoData	WellSim ver 4. 9.17	1		GRM	N/A (refer to Perpetual License)	
Laboratory	Software	Lawrence Berkeley Laboratory	TOUGH2 CORE with EOS1 module	1	JICA Kenya Office	GRM	GRM needs additional license fee for EOS2 and EOS3 modules. EOS2 and EOS3 are installed TOUGH3. License fee for TOUGH3 is 20,000	
	High-spec computer	ΗΡ	HP-Z230	1		GRM	N/A (GDC can manage maintenance by themselves)	
	Software	Lakes Environmental	AEROMOD View	1		Environment	N/A	
				1				
	Ultra sonic vibrator	Daihan	WUC-A03H	1		GRA	N/A	
Laboratory	Centrifuge	HETTICH	ROTOFIX32A	1	ЛСА Kenya Office	GRA	N/A	
	Gas Chromatograph		GC-8AIT	1				
	Gas filter		221-05619-01	1				
	Data processing unit	Shimadzu	C-R8A	1				
	Carrier gas tube	Snimadzu	201-48067-05 ZM 3	1				
	Facked column	-	Z.WI-5	1		GRA	4,000,000 Ksh for three years service contract	
	Packed column		ZP-18	I	-			
	Automatic voltage stabilizer	Yamabishi	TAC-5HS	1				
	Funnel	-		2	-			
	Funnel	-		1				
	Tube 1 inch×500mm Connector 50mm	Kyoei Rika	Order made	2	JICA HDQ (Equipment for expert)			
Laboratory		-		4		GRA	N/A	
	Elbow	-		1				
	Teflon Tube (6mm ×	Chiyoda	TF-8-20	1				
	Silicon Tube (8mm \times	As one	9-869-17	2				
							Department has already allocated the hudget for	
	Toxic Gas Analyser	Arizona Instrument	JEROME J605	2		Environment	calibration (300,000Ksh).	
	Water Analyser	YSI	ProDSS	1		Environment	N/A	
Laboratory	Sound Meter	RION	NL-42	2	ЛСА Кепуа Office	Environment	N/A GDC engineers can calibrate by themselves.	
	Software	Lake Environmental	ISC- AERMOD View Version9.1	2		Environment	Department has already allocated the budget for 3 years licence (500,000Ksh).	
	Software		FCRS Simulation Software	1		GRM	N/A	
	Software for Sound	RION	NX-42 EX (Extended Function	-				
	Meter	RION	Program)	2		Environment	N/A	
	pH/ORP sensors	YSI		1		Environment	N/A	
1				1		CPA	N/A	
	LiDAR Data			1	West Jec	OKA	IN/A	
	WellSim Perpetual License			1		GRM	Department has already requested to purchase renewal lisence, US\$ 5.000, for 3 years (2019 to 21) to HDQ.	
	Aster LB-1 Sat-Image			1		GRA	N/A	
						Total (5 years)		
						GRA	8,100,000 Ksh + 4,000 US\$	
						Environment	10,000 US\$ = 20,000 US\$ 800.000 Ksh	
						LITTIOINTA	000,000 1311	

添付資料 14: O&M status of Donated Equipment

15 : O&M status of Donated Equipment (Drilling Related)

Category	Date of	Name of goods	Manufacturer	Model	Delive	red QTY	Date of	Procuring	Plan for a Periodical Maintenance (Cost, frequency,	
cucchory	Order	Nume of Books	manatactarer	moder	packages	volume	delivery	Agent	schedule)	
		Software	Infostat systems	RIM Base 7	12				Department plans to allocate budget for subscription fee (1million Ksh) in the next financial	
									year.	
		Mud Test Kit	Fann Instrument	Porta Lab Model 804, Basic Mud	1				N/A	
			Company	Test Kit (207357)						, ,
		Cutting Machine(Plasma cutter)	Miller	Spectrum 875	2				Replace torch (1unit for 5 years) : US \$ 730	
Drilling	Apr.2015							JICA Kenya Office		
		Gas Monitoring Unit	Riken Keiki	HS-01	21		Jan. 2016		Calibration and exchange of sensor : JPY 20,000 (not included tranportation cost)/ unit	
									(Total JPY 420,000 equivalent to 420,000 Ksh for 5 years)	
		Rotary Slip	DenCon Tool	3056	4					
		Tong Lug jaw for AAX manual tong (pipe size 10-3/4	BVM	2-7/8 to 11-3/4inches	12					
		to 11-3/4inches)	BVIN	N0.1376	12				N/A	
Drilling	Apr.2015	Safety Clamp	DenCon Tool	12-1/2 to 13-5/8 inches	2			JICA Kenya Office		
		Casing Pipe Tong	Gearench	SCT1020	_					
		Lug jaw (pipe size 4 to 5-1/4inches)	BVM	No.1372	12					
Drilling		Lug jaw (pipe size 5 to 7-1/4inches)	BVM	No.1373	12		Mar. 2017	Office	N/A	
		Lug Jaw (pipe size 6-7/8 to 8-5/8inches)		10.1374	12					
					I					
		Viscosifier	TELNITE	TEL-POLYMER H (20kg/sac)	400	8,000kg				
		Dispersant	TELNITE	G-500S (20kg/sac)	75	1,500kg				
		Dispersant	TELNITE	BX (20kg/sac)	295	5,900kg				
Drilling	Nov. 2017	Deformer	TELNITE	EASY DRILL (18kg/can)	66	1,056kg	Mar. 2018	Mar. 2018	JICA Kenya Office	GDC has already started to procure additional mud chemicals (Already allocated the budget)
		Viscosifier & Lubricant			165	2,970kg				
		Forming Agent	TELNITE	TELFORMER 23L (18kg/can)	445	8,010kg				
		Alkaline agent (Sodium hydroxide NaOH)	Taiwan	Micro Pearl(25kg/pack)	344	8,600kg				
Drilling	Feb. 2018	Flocculant (Calcium hydroxide, Ca(OH) ₂)	Kenya	Rhino Lime (25 kg/pack)	40	1,000kg	Mar. 2018	JICA Kenya	N/A	
		Deflocculant (Sodium Bicarbonate, NaHCO ₃)	China	Food Grade (25 kg/pack)	80	2,000kg		onice		
		Mud Pump Sets	TSURUMI PUMP	NKZ3-D6/B6	4				Under confirmation (replace bearing, seals, lubrication for 5 years)	
		Cabtyre cable (30m)	TOTAKU	-	4					
		Hoses Line Ace (Dia.150mm/20m)	ТОТАКИ	-	4		r.			
Delline	5-h 2010						0-+ 2010	JICA Kenya Office		
Drilling	Feb. 2018	S-Color nipple (150mm)	TOTAKU	-	4		Oct. 2018		N/A	
		Power band (150mm) Hose Reducer (100 x 150mm, S-Color/Both	τοτακύ	-	16					
		sides)	Victaulic	S-0-100	4		r.			
		Victauric joint S type (150mm)	Victaulic	S-0-150	4 10					
				1	1					
consumal	Jies	Cablehead boot			5					
Drilling		Fishing neck			1			JICA HDQ (Equinment	Safety Department has budget for consumables.	
IIS		Rope socket cone			2			for expert)		
L		Contact sub assembly			2					
		Goggles			24					
		Chemical Gloves			24					
Drilling		Chemical Apron			24		Aug.2018	JICA Kenya	Safety Department has budget for consumables.	
		Face Shield			6			Onice		
		Dust Mask Potable Eve Washer			200					
	·			·		·		·		
		Sulphuric acid			1					
		Phenolphthalein (indicator)			1					
		Phenolphthalein (solution)			1					
		Potassium chromate			1					
Drilling		Sodium hydroxide pellets			1		Aug 2019	JICA Kenya	N/A	
2. amig		Edta disodium salt			1		-10b-2010	Office	20	
		Hydrogen peroxide			1					
		wernylene blue (powder)			1					
		Eriochrome black T			1					
		Buffer solution			3					
Drilling		pH liquid			12		Jan. 2018	West Jec	N/A	

添付資料 15: O&M status of Donated Equipment(Drilling related

Drilling West Jec N/A Band-it-tool + Mar.2015 T 1 T Total (5 years) 1,420,000 Ksh + 730 US\$

16 : Sustainable Training Program Building a Competency Development Program

Sustainable Training Program

BUILDING A COMPETENCY DEVELOPMENT PROGRAM

Project for Capacity Strengthening for

Geothermal Development in Kenya

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CHAPTER 1 INTRODUCTION

One of the outputs requested under the "Project for Capacity Strengthening for Geothermal Development in Kenya" is to establish sustainable training program which links and is reflected to the career. While this capacity building project covers almost all the corners of the GDC organization, it is not realistic to establish a comprehensive training program covering the all the modules under the project.

In this situation, it is sought to make a model training program which will bring the largest impact to GDC organization and will be relatively easier to capture and implement the program and we came to conclude it is best to target the drilling personnel from the new recruit until the driller which will be the icon of GDC driller.

The progression of career for the drilling personnel is illustrated in the figure below. The positions shown is similar to that of GDC up to "Driller". Though the position of "Toolpusher" in GDC is assumed to be "Shift leader", its capacity level differs the most as compared with the "Toolpusher" by definition. The reason why the training program is to address the career up to the driller is because the career path after reaching "driller" will have more options and also be influenced by many other factors, which a uniform training program is difficult to address.

We set the following objectives for the training program :

- Produce Driller with predefined competency in a given period
- Link the training program with the career development program(or promotion/pay rise)
- GDC management to have means to monitor/control the individual training progress and quality which is mainly conducted under OJTs.

PROPOSED TRAINING PROGRAM



1, Define target profile of each category of drilling personnel (rustabout, floorman, motorman, derrickman, driller, etc.) while considering the career progress.

- 2, Define key competencies for each target profile.
- 3, Define training goal and the period for each phase of the training curriculum.
- 4, Define training program (curriculum) to achieve above key competencies in terms of the technical/managerial/HSE and other subjects to meet the target profile
- 5, GDC management and H/R monitors and control training progress to assure maintaining quality of training mainly conducted by way of OJT.

For convenience purpose, we tentatively name the training program as follows: VISION PROGRAM (Seniority linked curriculum based career development program

The training addresses one of the most important components of the company, the human resource, on whom the company's future depends. The role of the project team merely assists the GDC's management to set up the training program. Upon this understanding, we prepared this training program.

CHAPTER 2 Define Target Profile

The general job description of each target is shown below:

- **Roughneck:** it's duties can include anything involved with connecting pipe down the well, as well as general work around a rig. The crew of a land-based rig can be further divided into several positions:
- **Toolpusher:** The highest position at the drilling location, responsible for every crew. A toolpusher may stay on location for a few days or weeks at a time during operations, whereas individual drilling crews work only eight- or 12-hour shifts or "tours" (pronounced as "towers").
- **Driller:** The head of an individual crew, responsible for controlling a rig's machinery during drilling, as well as most other rig operations.
- Assistant Driller: one step below the driller and is assumed to have similar competency as the driller.
- **Derrick-man:** Though the exact duties vary from rig to rig, they almost always report directly to the driller and second in rank to the driller. Responsible for the drilling mud, the mud pits where drilling fluids are circulated around the system, and the mud pumps, as well as being the hand up in the derrick manipulating stands into and out of the fingers during tripping operations. Acting as a lead for the driller who is mostly restricted to the rig floor. In many cases the derrickman is exclusively responsible for work in the derrick during "tripping" pipe in and out of the hole. In terms of skill, physical exertion and perceived danger, a derrickman has one of the most demanding jobs on the rig crew.
- Motorman: Responsible for maintenance of various engines, water pumps, water lines, steam lines, boilers and various other machinery incorporated into the rig on a daily basis. Also responsible for movement of equipment on site. On a four-man drilling crew the motorman is also the chainhand.
- **Floorman:** They work primarily on the rig floor where he is the one actually operating the tongs, iron roughneck, tugger, and catwalk, and doing pretty much any other job which is asked of them.
- **Roustabout:** Drillers start off as roustabouts until they gain enough experience to move up to a floorman position. A roustabout has no limits in the drilling rig and can, and will do any and all geothermal field work.

GDC has defined job description of some of the positions. For example, that for the derrickman is shown in the following table. It is likely that GDC has set of job descriptions of the target profiles addressed in this training program.

POST TITLE	DEBRICK MAN			
REPORTING TO:	DRILLER			
DEPARTMENT				
SECTION	OPFRATIONS			
LEVEL	GD9			
1. JOB PURPOSE				
The Derrick man carries out a variety	y of general duties and operates from the derrick and on			
the mud tanks to assist in the drilling	g and servicing of oil/gas/geothermal wells.			
The Derrick man's secondary respon	sibility is the mixing of mud chemicals and the measuring			
of mud density. He is second in rank	to the Driller.			
2. PRINCIPAL ACCOUNTABILITIES.				
Align and manipulate section	s of pipe or drill stem from the Monkey board at the rig			
derrick during the tripping in	and tripping out of drill stem and drill bit.			
Among the key people during	g Rig down, Rig move and Rig up drilling or service rigs			
Operate and maintain multiple Pood gouges to monitor press	umps, mud systems, and mix mud chemicals and additives.			
 nead gauges to monitor press procedure as required. 	sule, defisity, fate and concentration and adjust pumping			
 Record mud flows and volum 	es and take samples.			
Supervise floor men in their v	work.			
 Assisting the driller and comr 	nunicating to him the current operating conditions.			
Ensure safe operating proced	lures in circulation system.			
Check and maintain derrick a	nd lines above.			
Make sure the derrick is insp	pected before raising or lowering pipe.			
Maintain the fluid end drillin	ng equipment with the aid of the Driller			
 Inspect and grease the crow 	/n block			
Help out in the training of n	ew crew members			
Conduct and participate in BC	OP drills and explain what has to be done and assign each			
hand to specific jobs	the stast for and reast leaks in all lines, make sure quards			
Perform pre-spud salety clied are in place	cks, check for and repair leaks in an intes, make sure guarus			
 All other duties that may be 	assigned by the shift in charge			
- An other duties that may be	assigned by the sint in charge			
3. KNOWLEDGE AND EXPERIENC	Ε.			
O level and above				
3 vears' experience working as flo	oor man			
4. SKILLS AND COMPETENCIES.				
 Able to work independent 	ly with minimum supervision			
 Analytical skill and effective communication 				
• Team spirit.				
 Good supervision skills. 				
 Excellent interpersonal ski 	ills			
Capable in duties prioritiza	ation			

Table 2-1 JOB description of Derrickman defined by $\ensuremath{\mathsf{GDC}}$
CHAPTER 3 What is competency and its connection with training?

3.1 Definitions

One of the important steps of this program is to create list of required competency for each level of job workers. Some pages are allocated to provide guidance and outlines the importance of creating competency and setting up an assurance program. We adopt basic definitions for these key concepts: competency, competency standard, competency model, and competency assurance program.

3.1.1 What is competency?

Competency:	An individual's knowledge, skills, abilities, and behaviors.
. ,	Note: Although the definition of knowledge, skills, and abilities—often
	referred to as KSAs—is not exactly the same as that for competencies, KSAs
	and competencies serve the same purpose and are often used
	interchangeably

- Knowledge: An employee's clear and practical understanding of the material needed to perform his or her job successfully and efficiently. Knowledge may be tested.
- Skill: An employee's ability to perform the job tasks consistently, precisely, and reliably. Skills may be assessed.
- Ability: An employee's physical capabilities (e.g., climbing, lifting, seeing, hearing). Ability may be determined but typically cannot be enhanced.

3.1.2 What is a competency standard?

Competency Standard: The set of competency elements that comprises the total expectation of an individual in a specific role or position. It defines the expected level of performance as determined by the organization

3.1.3 What is a competency assurance program?

Competency Assurance Program: A structured and documented process of identifying, defining, assessing, developing, and managing the required competencies of company personnel. It includes the formal systems, tools, and processes that ensure personnel are competent to complete tasks to a determined standard.

3.1.4 How does competency differ from performance?

Competency encompasses the skills, knowledge, abilities, and behaviors required to perform a specific job. By using a proficiency scale, competencies indicate whether a person meets certain criteria and how well a person demonstrates the ability to do a job. By contrast, performance measures output, e.g., how well a person completes a specific task and adds value to the organization.

3.1.5 What is the difference between competencies and qualifications?

Competency differs from qualification in that a qualification is simply the prerequisite for doing a task, while competency is how well a task is done.

For example, many individuals pass a driving test and are qualified to drive a car, but they may not be good drivers and may cause accidents, so they are not competent in driving cars. Another example is that a college degree gives a person the qualification to get an entry-level job in an organization, but training and time doing the job helps that person to develop the competency to do the job well. Traditional qualification relies on attending trainings and on years of experience while competency is measured using observation of performance (knowledge, skills, abilities, behavioral attributes, etc.).

3.1.6 What is the difference between competency and training?

There is a belief that if an individual attends trainings, he or she becomes competent. Training is a means of acquiring knowledge. Knowledge can be tested, but competency must be demonstrated on the job. We can apply the 80/20 rule to training. Less than 20% of an employee's competence comes from traditional training (e.g., classroom, eLearning, etc.). Approximately 80% or more of the learning and competency is acquired through "on-the-job" and "hands on" training, coupled with experience and time in position.

"The 70-20-10 Model for Learning and Development is a commonly used formula within the training profession to describe the optimal sources of learning by successful managers. It holds that individuals obtain 70 percent of their knowledge from job-related experiences, 20 percent from interactions with others, and 10 percent from formal educational events.".

3.2 Components and basic process of Competency based Training Program

Competence programs may comprise all of a company's job titles/tasks, departments, and product lines, or may comprise only specific job titles. Tasks, departments, and product lines.

In the simplest terms, the scope of the program is many of the company's positions or job functions are included in the geographical area in which the program is implemented. There is no minimum or maximum size for a competence program. As a program grows and evolves, changes that affect its scope must be reported.



Figure 3-1 Training Program PDCA cycle

The sample case for the driller's training program, the program development may be described as follows:

- ① Define framework : The target of the program is from the roustabout to driller level
- ② Define framework : Define job description and requirements/ competencies for each level
- ③ Define framework : Define training tasks/curriculum to acquire competencies
- ④ Define performance parameters: Define conditions and period to clear each step of the training curriculum
- ⁽⁵⁾ Define assessment process: Define reporting/monitoring/assessment process for the monthly, annual and/or the event base(e.g. seminars) by first peer, secondary peer and/or H/R
- 6 Identify and qualify assessors and verifiers: As per 5.
- \bigcirc Implementation

The Assessment Cycle describes how to construct system to monitor/assess/ control the OJT quality for standardization of the training outputs. This is because, as explained in I-1-6, the most of the training takes place as form of OJT which is a decentralized and the training quality may be very influenced by the individual environment (tutor who is essentially his/her peer, work load, etc.). The management and H/R must make sure the quality of training by proper implementation of monitoring and assessment of the OJT. And if necessary they must intervene the OJT. The seminar is one of the effective tools to assess and standardize individual performance.

3.3 RESPONSIBILITY MATRIX

Each key personnel in the GDC organization must take responsibility in the set-up, implementation, outcome and the improvement of the training program.

As it was explained, the main venue for the training implementation occurs in the field as OJT. Therefore the direct peer of the trainee will be the most important person responsible for the implementation/monitor/control of the training and its quality. But because of its de-centralized nature, the top managers and the personnel department must be carefully monitor the quality of training and must make sure not only the progress and the quality of the training but also the standardization of the quality of the training.

Under the VISION program, the PDCA(Plan-Do-Check-Act) process is realized by the training curriculum, the monthly training report, the annual merit rating, the centralized control(paper test, practical test, clearing tasks) and/or the centralized seminars.

Competence Assurance Process Steps and Tasks in the Training Program for the Rig Operation Personnel	Drilling Operations Head	Management Representation	Department Head-Rig Operation.	HRHead	Competence Dev't Focal Porce	Line Manager / Supervice.	
 Identification and documentation of rig operations critical positions 	А	Т	Т	R	С		
2) Determination and documentation of Competence Requirement for the Rig Operations Job Competence Profiles	А	I	I	R	С		
required Levels of Proficiency for the tasks in the Job Competence Profiles	А	Т	T	R	С		
 Identify and provide Competence Assessors within the company's organization; 	А	Т	Т	С	S	T	
5) Conduct proficiency level assessment of an individual, and documentation	А	Т	Т	С	T	R	
6) Develop Individual Competence Development Plan	А	Т	Т	С	Т	R	
7) Implement and complete documentation and monitoring of the each Individual's development plan	А	I	Т	С	I	R	
8) Periodic re-validation of proficiency levels for rig operations positions	А	Т	Т	R	С	T	
9) Periodic review of competences relevant to rig operations position	А	Т	Т	R	С	Т	
10) Management Review of the competence assurance process and its results	А	R	с	S	Т		

Table 3-1 Competence Assurance Process Steps and responsibility matrix

Responsible - Person responsible for carrying out the task. This person typically reports to the Accountable Person

A Accountable (or Approver) - Person responsible for the whole task/activity. This person typically is the Line Manager/ S Supervisor of the Responsible Person

C Support - Person who provides support during the implementation of the activity / process / task

Consult - Person who can provide valuable advice or consultation for the task

Inform - Person who should be informed about the task progress or the decisions in the task

3.4 COMPETENCY DEVELOPMENT

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L

Competency frameworks vary across companies; each one must identify and choose which model will work best for them. The model should be designed as a resource that

provides a lifelong learning template of the core competencies and skills necessary for entry into the drilling profession as well as in maintaining proficiency.

- Competency models should include the competencies an employee must have now and in the future.
- Competency models must support the intended programs, e.g., assessment, development, performance management, etc.
- Competencies must be easy to use and understood across the organization



According to Thermaprime Drilling of Philippines, they categorize the competencies in 5 different groups: 1. CORE, 2, Drilling, 3, QHSE(quality, health, safety and environment), 4. RM (Records management), 5. SS (transport).

They kindly provide a suggested list of competencies required for a qualified driller. In fact up to the toolpusher level. As mentioned earlier, there is no minimum or maximum size for a competence program. As a program grows and evolves, changes that affect its scope must be reported. Therefore the competency list provided here should be treated as a mere reference and must be adapted to the GDC situation. The comprehensive list of competencies categorized in each group are shown in the Annex $2 \sim$ Annex 6.

 Table 3-2
 Competency Development

3.5 COMPETENCY RATING SYSTEM (EXAMPLE OF PROFICIENCY SCALE)

A competency program requires a system in rating employee performance against the identified competency for each position. Examples of rating system:

- Two-point; Competent/Not yet Competent
- Three-point; Needs Improvement/Capable/Proficient
- Four-point; Unsatisfactory/Needs Improvement/Competent/Exceeds Expectations

The proficiency scale shall be set based on the organizational needs. This table illustrates proficiency rating using a 5-point scale.

Competency Level	1	2	3	4	5
	Awareness	Application Level (Beginner)	Career Proficient Level (Mature)	Advanced Level (Mastery)	Expert Level (Excellence)
Qualitative Rating	Awareness of competency No opportunity to demonstrate competency	Significant advancement over entry level requirements (""entry" defined as minimum hiring requirements) Capabilities to perform basic types of work as related to the activities/tasks within the job family with close supervision.	Significant advancement over beginner level competence. Is a role model in the department? Capabilities to perform Virtually all work assigned in the department/division / function as related to the activities/ tasks within the job family with minimum supervision. Able to make wise recommendations	Significant advancement over mature competency level, bringing greater value to the organization and higher learning requirement for the individual. Is a role model in the organization .Capable to provide advices on all work assignment in the department/division /function as related -to the activities /tasks within the Job family without supervision and able to- decide.	Achievement of a proven track record in providing knowledge and solutions within the organization and is an industry expert and role model. Capabilities to perform most complex and technically demanding work within the organization without supervision and able to decide.

Table 3-3 Competency Guide – Proficiency Scale

3.6 COMPETENCY BUILDUP

Each line competency shall be rated. It is important to understand the meaning of each rating and the expectations are based on the job requirements. With help of the human resource department of Thermaprime Drilling of Philippines, we prepared a sample competency list for the drilling personnel, e.g. Roustabout, Floorman, Motorman, Derrickman, Assistant Driller, Driller and Toolpusher shown in the Annex. The competency list for the toolpusher is shown just as reference and this position is not part of the training program in the VISION program.

The diagram shown below illustrates how competency is built up with number of required competencies for each level of drilling personnel. Those comprehensive list of required competencies for each level with suggested competency level are shown in Annex 7 ~ Annex 13.



Table 3-4 Competency build-up with career progress

3.7 CAREER PROGRESSION

How the organization defines, assesses and rates employee competence is based on business need and legal requirements. Once established it will show a clear path to achieving the next level position and level, based on the set standards and the curriculum for the training program.

In the following diagram, a rule of thumb career progression in rig operations is shown. The most of the current drilling work force in GDC have not followed this career progression nor the associated training program.

It is required to fulfill the missing gaps in the required competencies for the relevant GDC drilling personnel.





CHAPTER 4 Training Curriculum

The training curriculum is based on the required competency for the next level of the career step. In accordance with the standard career progression and the competency requirement, the following training plan is presented.

Seniority	Phase	Title	Curriculum	Seminars	Controls
(months)			Competencies		
0~12	VISION-1	Junior	CORE-1		
		Roustabout	QHSE-1		
12~36	VISION-2	Roustabout	CORE-2	Basic	Floorman
(24)			QHSE-2	drilling	Control
			Drilling-1	seminar	
36~60	VISION-3	Floorman	RM-1	Next Phase	Motorman
(24)			QHSE-3	DRILLING	Control
			Drilling-2	SEMINAR	
60~90	VISION-4	Motorman	CORE-3		Derrickman
(30)			QHSE-4		Control
90~114	VISION-5	Derrickman	CORE-4	1st	
(24)			QHSE-4	Advanced	
			Drilling-3	Drilling	
			RM-2	Seminar	
			SS-1		
114~138	VISION-6	Derrickman	CORE-5	2nd	Assit.Driller
(24)			QHSE-5	Advanced	Control
			Drilling-4	Drilling	
			RM-3	Seminar	
			SS-2		
138~162	VISION-7	Assistant	CORE-6	3rd	Driller Screen
		Driller	QHSE-6	Advanced	Test
			Drilling-5	Drilling	
l			RM-4	Seminar	Driller Control
1			SS-3		

Table 4-1 Summary of the VISION program

The most of the training is conducted by OJT basis with occasional centralized seminar for quality control. Therefore the peer in the work is their tutor and primarily responsible for the training quality and the progress. The H/R and HQ management must make sure the VISON participants understand the program and importance to adhere the VISION requirement.

Regarding the learning materials, in the JICA capacity build up project, more than 6000 pages of the handbooks for the training purpose has been created in addition to the visual training material. Nearly half of the handbook pages are dedicated to the drilling

module and all the visual aid is are prepared for the drillers training. These handbooks and visual aid should serve OJT and seminar lecturing for the VISON program.

Because the most of the training scene is decentralized, there needs occasional events to monitor and control the training quality. The monthly training report and annual merit rating serves this purpose. But also the centralized training seminars are very effective to monitor the performance of trainee, detect flaw in the specific OJT and/or standardize the training/capacity quality. Regarding the seminar, if possible, the annual schedule of the seminars should be prepared and advocated well in advance. If it is not possible, the seminar schedule must be known to all the GDC personnel well in advance so that the relevant participants can plan for them considering job workload and/or private constraints.

As part of the training, it is recommended to give some hand-on training such as having the trainee carry out some maintenance program of the drilling equipment.

CHAPTER 5 Training Reporting and Monitoring

As mentioned above, because the training scene is mainly by the decentralized OJT, the management and H/R must monitor the quality of the training and its implementation. The sample monthly training report shown below is one of the vital tools. The format of the monthly training report is straight forward so that the training progress and its achievement can be glanced easily.

The column can be added to show number of competency completed vs. total number of competencies to be completed in the particular VISION curriculum. Columns for the date of completion of VISION task and the plan are provided to assess the training progress. The trainer (often trainee's peer) must make sure the trainee makes effort to complete the tasks in time and to plan for the attendance on the relevant seminars. Another tool to monitor and control the training progress/quality is the annual merit rating. The current GDC merit rating form can be modified to accommodate such function. A sample format is shown in Figure VI-2 and 3. The other forms associated the annual merit rating such as interview record, job performance plan and review can be added according to the needs and relevancy.

Among the other purposes, these forms are communication tools for monitoring and controlling the training between the trainee and the management/HR people.

				6	MON	TUIV		Name
	VI	SION Ceothermal	T	RAIN	IING	PROGRAM	Month	District/Loc
		Powering the Vision			(DRII	LER)	Seniority	VISION Director
	Time SCALE	VISION Requirements	Target DATE	ACTUAL DATE	RATING	PROGRESS REPORT (act	hievement last month)	
			♣	₽	➡			
	162	Driller						
		Driller Control						
		Drillir Screen Test						
9		3rd Advanced Drilling Seminar				_		
NO	24	SS-3				_		
VISI		RM-4						
		QHSE-7				_		
		DL-5				_		
		CO-6				_		
_		Assit.Driller	-			_		
		Assit.Driller Control	_			_		
		2nd Advanced Drilling Seminar	_			_		
N 6		SS-2				_		
ISIC	24	RM-3				_		
>		QHSE-6				_		
		DL-4						
		CO-5				_		
		1st Advanced Drilling Seminar				_		
2		55-1				_		
l õ	24							
Š		QHSE-5				_		
		DL-3						
		Derrickman				NEXT MONTH TRAINING	G PROGRAM	
4		Derrickman Control						
Z O	30	OHSE-4						
VISI	50	CO-3				_		
-		Motorman						
<u> </u>		Motorman Control						
ŝ		Next Phase DRILLING SEMINAR						
NO	24	RM-1				_		
VIS		QHSE-3						
		DL-2				COMMENTS BY VISION	DIRECTOR / FIELD SER	/ICE MANAGER
		Floorman						
		Floorman Control						
۷ Z		BASIC DRILLING SEMINAR						
SIG	24	QHSE-2						
Ĭ		DL-1						
		CO-2						
		Roustabout					1	
N 1		Roustabout CONTROL						
SIO	12	QHSE-1						
>		CO-1						
		Orientation/Introductory	Traini	ng		DISTRI	BUTION : Driller / DRILLING	DEPT. / HR

Figure 5-1 Sample Monthly Reporting Form

	NAME	SALARY GR	ADE	SENIORITY	DATE		PLA	CE OF A	SSIGNMENT	DATE OF ASSIG	NMENT		POSITION	1	BIRTH	DATE		
	1.	SPEC	FIC C	DBJE	стіу	'ES A	ND	RE	SULT	S SUM	MAR	RΥ						
	Outline of Specific Object	ives					Resu	lts				0	Con	nments	; - ?	lte		
				2.	PE	RFO	RM	AN	CE									
					E G	6 S	U	_							E	G	S	U
	1. Theory, application and limitations	of drillin	g servic	es				7.	Appeara	ance of eq	uipmer	nt						
	2. Operational skill of drilling services							8.	Troubles	hooting and	repair	of mech	anical eq	uipment		<u> </u>		
	Manual skill. Mechanical aptitude Theory application and limitations	of drillin		mont				1 9.	I roublesi	nooting and	repair	of electi	ricai equip	pment	H	H		
	4. Theory, application and limitations of	ulics	g equip	ment				1 10	Condu	ct quality	- froo	onerat	ions			H		- Г
	6 Application of MAINTENANCE PROC	RAM					Г		Overal	l technical	nerfor	mance	IUIIS		H	<u>–</u>		
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╞	EXPERIENCE																	
	MODERATE																	
	NO EXPERIENCE																	
	Knowledge of geology and reservoir a Knowledge of geoscientific parameters a Knowledge of RIMBASE Knowledge of CH Interpretation COMMENTS	engineer nd drillin	ing g perfori	mance] 5.] 6.] 7.	Applicat Client re Job follo Overal	tion of Inte elations ow up or c I sales perf	erpreta lient fo	tion kn Illow up Ice	owledge	2				
ŀ	1. Job planning] 7.] 8.] 9.] 10	Commu Commu Motivat). Apprai	inication w inication w tion of sub isal of crev	rith sub rith per ordinat r	pordina ers and tes	tes supervis	sor				
	 Organizations and direction of crew Makes sound decisions Accomplish results Delegation of responsibility and aut Leadership 	hority]	Overal	l managen	nent							C

Figure 5-2 Sample merit rating form 1/2

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Powering	the Thios	0000000			10-0	age aj	
GDC	Drilling Department						DATE
			E	G S	U		EGSU
	1. Attitude towards safety					4. Driving Habits	
≻	2. Safety record			п	п	5	
Ē	3. Promotion safety			50		Overall technical performance	
SAI			L.			•	
(5	1. Self training					4. Lecturing ability	
ž	2. Involvement in training(VISION)					5	
Z	3. Ability to develop people					Overall sales performance	
LR ^A	COMMENTS						
		3	. PERSO	ONAI	LQU	ALITIES	
	1. Personal appearance					9. Hard worker	
	2. Attitude					10. Ability to work under pressure	
	3. Enthusiasm/Agressiveness					11. Ability to express himself	
	4. Physical resistance					12. Co-operation	
	6. Creativity				H	14. Dependability	
	7. Matuarity/Common sense			5 0		15. Linguistic ability	
	8. Adaptability						
	COMMENTS					Overall disposition for GDC drillin	g job 🔲 🗖 🗖 🗖
						-	
		4. MA	JOR STR	RENG	ίтн	& WEAKNESS	
		(List the mai	n strength a	nd mai	n wea	kness, with comments)	
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		ЦВ					
		5	. DRILL	ER'S	con	IMENTS	
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EMPLOYE	EE SIGNATURE		DEL/IELA/IA	NAME		SIGNATURE	LE DATE
			MANAGER	'			
							I
DIST	RIBUTION: HR, NAIROBI	D	RILLING D	EPAR	IMEN	T, POLO CENTRE	

Figure 5-3 Sample merit rating form 2/2

Seminar is another tool not only for teaching but also for monitoring and controlling the training which is primarily conducted in the OJT. Therefore the key seminars under Vision Program are well schedule in advance and fixed so that the participants and their peers can plan these seminars well ahead.





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MONDAYS		7	14	21	28	4	11	18	25	4	11	18	25	1	8	15	22	29	6	13	3 20	27	3	10	17	24	1	8	15	22	29	5	12	19	26	2) 11	5 23	30	7	14	21	28	4	11	18	25 :	2	9 :	16 2	3 30
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NEW SERVICES					-	1												F	t	1	+	t		F		F	F											1	t	1										+	+
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Figure 5-5 Meeting and Seminar Planner for Drillers

Annexes

Annex-1 : Competency List: - GENERAL CORE COMPETENCIES

Annex-2 : Competency List related to CORE

Annex-3 : Competency List related to Drilling

Annex-4 : Competency List related to QHSE

Annex-5 : Competency List related to Record Management

Annex-6 : Competency List related to Transport

Annex-7 : Competency Table: – Roustabout

Annex-8 : Competency Table: – Floorman

Annex-9 : Competency Table: – Motorman

Annex-10 : Competency Table: – Derrickman

Annex-11 : Competency Table: – Assistant Driller

Annex-12 : Competency Table: - Driller

Annex-13 : Competency Table: - Toolpusher (merely for reference)

Annex-1 : Competency List: – GENERAL CORE COMPETENCIES

GENERAL CORE COMPETENCIES

No.	Competencies	
1	Integrity & Professionalism	 Honors and delivers commitments and consistently acts in a fair, honest and respectful manner in all dealings and transactions with partners and stakeholders guided by governing rules and highest ethical standards Carries out responsibilities according to ethical standards, avoids opportunities that would create conflict of interest Adheres to a set of values comprising professional obligations, agreed codes of conduct, acts in the company's best interest and maintains the standards of competence and knowledge Accomplishes obligations on time
		Complies with professional and ethical standards
2	Commitment	Strives to exceed industry standards in terms of products, processes and convices through flowless evenuation, continuous
	to Excellence	improvements and employee involvement
		 Takes ownership of company's vision and values and applies to the agreed results
		 Continuously evaluates drilling operations processes and
		recommends improvements on current practices
3	HSE Leadership	 Understands, takes ownership and encourages others in the execution of our integrated HSE management system Embraces safety as the way of life in the rig
		 Implements strict adherence of all personnel and yard crew to the HSE program and calls the attention of anybody who deviates from it
4	Teamwork	 Works together cooperatively to achieve a common goal. Resolves conflicts and shares resources
		 Good team player and works with the team with customer satisfaction in mind
		 Maintains an open and honest relationship with work crew and third party contractors
5	Initiative/	Proactively identifies and initiates changes; flexible in managing
	Willingness to	changes to improve processes and achieve results
	Change	 Acts immediately on operational concerns to prevent lags and achieve results

No.	Functional	Description of competency
	competency	
		Demonstrate ability to follow the permit-to-work and lockout/tagout procedures required for crane operations.
01	Crane Basics	Describe the lifting equipment available on current location.
		Describe the type(s) of crane(s) by name and type, found on current location.
		Demonstrate ability to use all rigging hitches (e.g., basket, choker, vertical, bridle) needed for the current job.
		Demonstrate adhering to the permit-to-work for routine and non-routine rigging tasks, if applicable.
		Demonstrate correct and safe use of taglines attached to loads, including proper positioning and quantity.
		Demonstrate following the lift plan required for critical lift rigging tasks.
		Demonstrate how to correctly rig a load according to its specific center of gravity.
		Demonstrate the ability to control an area where lifting operations are being carried out.
		Demonstrate the ability to correctly and safely connect/disconnect loads.
		Demonstrate the ability to correctly secure cargo in various conditions.
		Demonstrate the ability to find the center of gravity of a load.
		Demonstrate the ability to select the appropriate rigging equipment for a specific job.
		Demonstrate the use of sling capacity tables.
		Determine and/or estimate weight of loads for the purpose of rigging safely.
		Explain center of gravity as it relates to rigging.
		Explain D/d ratio for wire rope sling.
02	Rigger Basics	Explain how the tension or loading increases as sling angles decrease, especially the rapid increase in tension that occurs when slings are used below 30
_		degrees. Evaluin the different methods in which a clings are rigged or attached to load
		Explain the different methods in which a sings are rigged of attached to load.
		Explain the effect of branding the lags of a vertical backet hitch inwards
		Explain the effect of bringing the legs of a vertical basket inter inwards.
		be used or forced over a hook or pin.
		Explain the importance of using padding (protection over sharp edges).
		Explain the risk of using wire rope clips (i.e., clamps) to fabricate wire rope slings eves.
		Explain the use of push poles, if required by company policy.
		Explain vertical and horizontal planes as they relate to rigging (e.g., how force is distributed based on the plane).
		Explain why a wire rope hand-tucked splice should not be used in a single vertical lift.
		Explain why the chain sling must never be used when twisted, knotted, or
		whenever the links bind and do not move freely.
		Explain why the eye of a wire rope sling should never be forced over a hook or pin.
		Explain why the hook should not be inserted into one of the chain links.
		Locate company policies and procedures that apply to rigging.
		Select correct slings, or other similar lifting devices, according to size, weight, and configuration.

Annex-2 : Competency List related to CORE

		Explain the basic rigger's role in ensuring safe lifting operations.
		Explain the basic rigger's role in ensuring that all lifting gear is certified to
02	General Rigger	company and regulatory requirements.
05	Qualifications and Role	Explain who at the jobsite is authorized to use rigging hardware.
		List the recommended qualifications, experience, and training necessary to be able to rig a load (see API RP 1e, 2d, latest edition).
		Describe and explain sling manufacturers' recommendations for safe slinging configurations.
		Describe the proper installation and rigging of all permanent and temporary lifting points (anchor points, pad eyes, etc.).
04	General Rigging Hardware	Describe the proper use of tag lines attached to loads, including proper positioning and quantity.
04	Information	Describe the storage requirements for all rigging hardware (rigging/slings/shackles, etc.).
		Explain how the sling capacity changes when using different sling configurations.
		Explain how to interpret manufacturer's guidelines for rigging hardware.
		Locate the manufacturer's guidelines, as applicable, for rigging hardware.
		Demonstrate ability to maintain and inspect hand and power tools in operationally safe condition, without any unauthorized modifications.
		Demonstrate proper application, use, and inspection of cargo nets.
		Demonstrate proper application, use, and inspection of chain binders.
		Demonstrate proper application, use, and inspection of chain falls.
		Demonstrate proper application, use, and inspection of chains.
		Demonstrate proper application, use, and inspection of come-alongs.
		Demonstrate proper application, use, and inspection of drum lifters.
		Demonstrate proper application, use, and inspection of eye bolt types.
		Demonstrate proper application, use, and inspection of hoist rings.
		Demonstrate proper application, use, and inspection of hook types.
		Demonstrate proper application, use, and inspection of master links.
		Demonstrate proper application, use, and inspection of pad eyes.
05	Rigging Hardware	Demonstrate proper application, use, and inspection of pallet forks.
	Inspection & Maintenance	Demonstrate proper application, use, and inspection of plate clamps.
		Demonstrate proper application, use, and inspection of shackles types.
		Demonstrate proper application, use, and inspection of spreader bars.
		Demonstrate proper application, use, and inspection of turnbuckles types.
		Demonstrate proper application, use, and inspection of web slings.
		Demonstrate proper application, use, and inspection of wire rope clips.
		Demonstrate proper application, use, and inspection of wire rope slings.
		Demonstrate the proper application, use, and inspection of personnel lifting baskets.
		Explain procedures to follow when defective rigging hardware is identified.
		Explain the lifting gear color-coding system and how records are kept for each item.
		Identify appropriate tools and materials for the purpose of performing preventive maintenance and minor adjustments.
06	General Crane Operator Qualifications and Role	Explain the crane operator's role in ensuring safe lifting operations.
10	General Crane Operation HSE	Explain the importance of designating one person to give correct hand signals and responding appropriately to those hand signals.

		Explain why personnel should observe and report any fluid leaks from the crane that could be contaminating the work environment and affecting safe operations.
		operations.
		Identify the appropriate personal protective equipment required for crane/lifting operations.
		Demonstrate ability to ensure that deck personnel use safe lifting procedures (e.g., tag lines, escape routes).
15	General Rigging HSE	Demonstrate correct use of personal protective equipment.
		Demonstrate the ability to identify pinch points and explain proper body position.
16	Crane/Rigging Operations Communications	Demonstrate ability to write clear and concise reports, such as those involving near-misses and incidents, involving lifting operations.
		Demonstrate how to properly utilize personnel lifting equipment.
		Demonstrate how to select the proper personnel lifting equipment/device.
		Explain conditions, authority, and hand signals necessary to stop personnel lifting operations.
17	7 Personnel: Lifting Operations	Explain procedures for raising and lowering a personnel basket safely.
		Explain the importance of load balance, weight tolerances, and environmental conditions before and during personnel transfer.
		Explain the precautions and pre-lift requirements applicable before personnel are transferred or lifted.
		Demonstrate how to properly utilize personnel lifting equipment.
		Demonstrate how to select the proper personnel lifting equipment/device.
		Describe the basic work sequence/policy followed prior to making a critical lift.
18	Offboard/Onboard Supply Boat Lifting Operations	Explain conditions, authority, and hand signals necessary to stop personnel lifting operations.
		Explain the importance of load balance, weight tolerances, and environmental conditions before and during personnel transfer.
		Explain the precautions and pre-lift requirements applicable before personnel are transferred or lifted.
19	Company-Specific Crane Ops Policies & Procedures	Explain why the hook should not be inserted into one of the chain links.
20	General	Demonstrate cleaning and organizing the work area upon completion of the work, task, or repairs.
20	Housekeeping/Orderliness	Explain procedures personnel should follow if they observe worksite and water pollutants during lifting operations.

No.	Functional competency	Description of competency
		Demonstrate how to secure the BOP for transit.
01	Rig Move (Skidding/Walking): Skidding Rig with BOP Suspended	Explain the need to assign watchmen to important areas during transit.
		Demonstrate ability to coach drill crews on how to be able to position rig on well center.
		Demonstrate ability to utilize correct measuring methods and techniques to position rig on well center.
02	Rig Move (Skidding/Walking):	Demonstrate ability to coach drill crews on how to be able to position rig on well center.
02	Location of Hole Center	Demonstrate ability to utilize correct measuring methods and techniques to position rig on well center
03	Rig Move (Skidding/Walking): Unload and install matting boards	Demonstrate ability to spot matting boards as per rig design.
04	Rig Move (Skidding/Walking): Well Control Equipment	Demonstrate the ability to install choke, flow, flare, and diverter lines.
05	Rig Up: Unload and install matting boards	Demonstrate ability to ensure only approved and certified lifting equipment is utilized.
05	Rig Up: Unload and install matting boards	Demonstrate the ability to recognize approved and certified lifting equipment.
06	Rig Up: Spot & Assemble Substructure Base & Associated Bracing	Demonstrate ability to spot sub base on well center as per rig design.
	Rig Up: Spot & Assemble Shaker Tanks, Intermediate Tanks, Suction Tanks &/or Reserve Tanks	Demonstrate ability to inspect and tighten all hammer seal unions to equalizer and mud mixing lines.
07		Demonstrate ability to properly earth ground equipment.
		Demonstrate ability to spot mud tanks level, in proper order and in line as per rig design.
08	Rig Up: Spot Mud Pumps & Assemble All Suction Lines, Pressure Release Lines & Braces	Demonstrate the ability to spot mud pumps and rig up all associated plumbing and operating lines.
09	Spot & Assemble Suitcases and lines	Demonstrate ability to inspect and tighten all hammer seal unions between suitcases to prevent fluid or air leaks.
		Demonstrate ability to properly earth ground equipment.
		Demonstrate ability to spot suitcase level, in proper order and in line as per rig design.
10	Rig Up: Spot & Rig up Rig Power Package & Fuel Tank	Demonstrate ability to properly install all electricity connections and fuel lines.
		Demonstrate ability to spot power package & fuel tank level, in proper order and in line as per rig design.

Annex-3 : Competency List related to Drilling

11	Rig Up: Startup & Energize Rig Power	Demonstrate the ability to start up generators and VFD/SCR systems.
12	Rig Up: Assemble Rig Floor structural supports	Demonstrate ability to install structural supports.
13	Rig Up: Rotary system	Demonstrate ability to rig up rotary and applicable drive system.
14	Rig Up: HPU	Demonstrate the ability to rig up the HPU system.
15	Rig Up: Energize Draw Works & Driller Control	Demonstrate ability to function test the Draw Works operations and emergency shut down.
	Rig Up: Energize Draw Works & Driller Control	Explain Draw Works & Drillers Console energizing procedures & requirements.
		Demonstrate ability to correctly connect all hydraulic lines.
16	Rig Up: Pipe Handler Equipment	Explain the process for assembling derrick/mast, raising structure & equipment.
		Demonstrate the ability to perform the Pre-Raise Mast/Derrick Inspection.
		Demonstrate the ability to raise and secure Mast/Derrick to Rig Floor.
		Demonstrate the ability to string up lines & blocks in the mast/derrick.
17	Rig Up: Derrick/Mast Assembly	Demonstrate the process for assembling derrick/mast, raising structure & equipment.
		Ensure derrick ladders are in proper position & stand pipe connected.
		Explain how to raise and secure Mast/Derrick to Rig Floor.
		Explain the Pre-Raise Mast/Derrick Inspection.
10	Pig Lip: Pig Floor	Demonstrate the ability to install & rig up winches and air tuggers.
18	Rig Op: Rig Floor	Explain how to install & rig up winches and air tuggers.
		Demonstrate the ability to Fill Mud Tanks, Check & Repair Leaks & Function Test All Associated Equipment.
20	Rig Up: Mud Tanks	Demonstrate the ability to install flow line & associated equipment.
		Demonstrate the ability to install mud mix equipment.
		Demonstrate the ability to install solids/gas control equipment.
22	Rig Up: Drill Water Systems	Demonstrate the ability to Install Trip Tank & Associated Equipment & lines.
22	Rig Up: Drill Water Systems	Demonstrate the ability to set Reserve Water Tanks, Rig Water Tanks, and Check & Repair Leaks.
22	Rig Up: Well Control Equipment	Demonstrate the ability to position choke manifold/gas separator.
23	Prepare for Rig Down: Preparation	Explain what can be prepared for move prior to rig release.
24	Prepare for Rig Down: Inspection	Explain pre-move inspection/check list.
25	Prepare for Rig Down: Work plan	Explain pre-move JSA/Work Plan, including 3rd party involvement.
26	Prepare for Rig Down: Crew Deployment	Explain supervision/crew deployment for rig down.

		Demonstrate ability to ensure all equipment has been removed from location.
		Demonstrate ability to ensure BOP and associated equipment is nippled down and loaded out.
		Demonstrate ability to ensure only approved and certified lifting equipment is used.
		Demonstrate ability to lower and prepare mast for transport.
27	Rig Down: Critical Steps	Demonstrate ability to shut down power for ancillary equipment.
		Explain ability to ensure correct order for shut down of ancillary equipment.
		Explain critical steps for rig down and move.
		Explain JSA / Work Plan knowledge for each critical step.
		Explain load out procedure / order of equipment to be moved.
		Explain Repair & Maintenance plan (if applicable).
		Explain required coordination between rig crew, supervisor, move crew, and 3rd party vendor.
		Demonstrate ability to ensure anchor points are identified for crew lanyards.
28	Rig Down: Fall Protection	Explain pin removal and associated hazards.
		Explain procedures for working around the cellar/well head.
20	Rig Down: Inspection Process	Explain inspection process for drill line.
29		Explain pre-move inspection process for ancillary equipment.
	Rig Down: Transportation Rig Down: Environmental	Demonstrate ability to ensure drill line is prepared for travel.
		Demonstrate ability to separate and load out substructure.
30		Explain how to secure all lines, piping and physical objects to prevent hazards during transporting.
		Explain mat cleaning requirement prior to load out.
		Explain drilling fluid capture and transfer process.
		Explain, if applicable, the process for oil-based mud (OBM) rig clean up and containment.
		Demonstrate ability to complete a stack out inventory list.
31		Demonstrate ability to ensure rig components are stored in an appropriate location and secured.
		Explain procedure for ensuring power equipment is prepared for storage.
		Explain the procedure to ensure rig components are stored in an appropriate location and secured.
	Vertical/Conventional Drilling: Rig Math, Well Head and BOP Control Equipment	Demonstrate how to measure, strap, & caliper all tubulars.
33		Demonstrate how to check drilling fluids characteristics and measurement.
		Demonstrate how to measure from Rotary Kelly Bushings to Well Head/Rotary Kelly Bushings to all Blowout Preventer Rams and Annular.

		Demonstrate how to perform math calculations on pressure & volume.
		Explain the rig components and their limitations.
		Demonstrate how to operate drawworks and associated components.
34	Vertical/Conventional Drilling: Drawworks & Associated Equipment	Explain the function of drawworks and all associated components (crown saving devices, brake systems & coolant lines, guards, chains, sprockets, gear boxes, shut downs, hoisting/lowering limits per rig design).
35	Vertical/Conventional Drilling:	Demonstrate how to ensure that moving equipment does not interfere with other equipment/machinery - Simultaneous Operations.
		Explain the importance of checking the equipment prior to use.
		Demonstrate how to follow the client's daily drilling plans.
36	Vertical/Conventional Drilling: Execution Of Drilling And Well	Demonstrate how to maintain an accurate pipe tally in relation to the well design.
	Operations	Demonstrate how to make trips.
		Demonstrate how to complete the daily tour sheet
		Demonstrate how to ream at the correct RPM and GPM.
37	Vertical/Conventional Drilling: Drilling/Reaming	Explain the importance to maintain complete records of all tools and tubular run into the hole (including make-up lengths, tool-joints OD, ID, Serial numbers).
	Vertical/Conventional Drilling: Pipe measurement, number and strapping of pipes	Demonstrate correct measuring points on all tubular, casings and tools.
39		Explain how to correctly read a strapping tape.
		Explain how to properly number stands in derrick when TIH or POOH.
40	Vertical/Conventional Drilling: Stuck Pipe Operation	Demonstrate how to determine the drill string operating limits.
41	Vertical/Conventional Drilling: Downhole problems and equipment failure	Explain downhole problems and potential equipment failures.
42	Vertical/Conventional Drilling: Standpipe and Bleed Off Line	Demonstrate how to ensure all valves are in the "full open" or "closed" position.
	Vertical/Conventional Drilling: Tripping	Demonstrate how to correctly monitor and record mud return and fill volumes while tripping in/out to recognize warning signs for well control issues.
44		Explain efficient tripping speeds in open hole and when bit/ stab go through BOPs.
		Explain how to monitor and record mud return and fill volumes while tripping in/out to recognize warning signs for well control issues.
45	Vertical/Conventional Drilling: Drilling Program	Explain how to plan and carry out all aspects of the client's well program.
47	Vertical/Conventional Drilling: Picking up drilling assembly	Demonstrate the ability to caliper and measure the BHA.
		Demonstrate the method for strapping and counting the drill pipe.

		Explain the importance and how to caliper and measure the BHA.
		Explain the method for strapping and counting the drill pipe.
		Explain fluid displacement when TIH.
		Explain kick identification while TIH.
48	Vertical/Conventional Drilling: Trin in hole (TIH)	Explain the importance of recognizing bridging conditions.
		Explain the importance of surge/swab hole conditions.
		Explain the procedure if a kick is detected during TIH.
		Explain displacement as drilling assembly is pulled out of hole.
49	Vertical/Conventional Drilling: Trip out of hole (TOH)	Explain kick identification while TOH.
		Explain procedure if a kick is detected during TOH.
		Demonstrate how to maintain equivalent circulating density (ECD) during underbalanced drilling.
		Explain additional instrumentation used during underbalanced drilling.
50	Vertical/Conventional Drilling:	Explain pit volumes and flow characteristics.
	onder balanced Drining	Explain the use of rotating control device (RCD).
		Explain the well control procedures and process during underbalanced drilling.
	Well Control: Riser/Diverter/ BOP (Run & Retrieve)	Demonstrate how to install new wellhead gaskets.
		Explain how to identify ring gaskets in relation to BOP flanges.
51		Explain how to install new wellhead gaskets.
		Explain the different phases of nippling up BOP and diverter based on hole section.
		Explain how to pump either kill mud or water.
52	Well Control: Diverting	Explain the importance of operating the diverter.
		Demonstrate function test of the BOP.
52	Well Control: Management Well Control Systems	Explain BOP components, their functions and their limitations.
53		Explain the normal line up of BOP valves, Hydraulic chokes, Choke manifold and degasser in accordance to the well program.
	Well Control: Well Integrity And Well Control	Demonstrate how to take SPR's, complete kill sheet and take accurate and correct SIDPP and SICP gauge readings.
54		Explain how to take SPR's, complete kill sheet and take accurate and correct SIDPP and SICP gauge readings.
		Explain the different methods for shutting the well and the killing procedures.
		Explain how to recognize influx and shut in well.
		Explain instrumentation used during air drilling.
55	Unconventional Drilling: Air Drilling	Explain rig up of low pressure air system into high pressure mud system.
		Explain the differences between mud drilling and air drilling.

		Explain the function of blooie line and how to secure.
		Explain the importance of an igniter at the end of a blooie line.
		Explain the pressure differential between input air and return air.
		Explain the use of rotating control device (RCD).
		Explain pick up and lay down procedures of the core barrel.
		Explain the differences between conventional coring and sidewall coring.
56	Unconventional Drilling: Coring	Explain the hazards when retrieving cores.
		Explain the relationship of the outer and inner barrels for coring.
	Directional Drilling: Mechanical	Explain the application for Teledrift type drift indicators.
57	Survey Tools	Explain the application for Totco type drift indicators.
58	Directional Drilling: Magnetic Survey Tools	Explain the application for Multi-shot film.
58	Directional Drilling: Magnetic Survey Tools	Explain the application for Single shot film.
	Directional Drilling: Gyroscopic Survey Tools	Explain how information travels from the MWD to the surface to the computer system.
		Explain the application for Electronic single and multi-shot instruments.
		Explain the application for Magnetic and gyroscopic MWD surveys.
59		Explain the application for Multi-shot.
		Explain the application for Single shot.
		Explain the MWD components.
		Explain the purpose and positioning of Non-magnetic drill collars and the BHA.
	Directional Drilling: Wellbore Surveying and Record Keeping	Demonstrate ability to solve problems associated with running a survey.
		Demonstrate application of the above.
		Demonstrate how to run a survey.
		Differentiate when survey data may be considered valid or invalid.
60		Explain general practices to take to prevent survey data discrepancies.
		Explain problems associated with survey data.
		Explain the application for elements of a directional survey.
		Explain the concepts dogleg and how dogleg severity affects the wellbore.
61	Directional Drilling: Directional Plots and Drilling Parameters	Drilling Parameters & Directional Drilling: Explain hydraulics with and without downhole motors.
		Drilling Parameters & Directional Drilling: Explain mechanical limitations of downhole motors.
		Drilling Parameters & Directional Drilling: Explain rotary speed limitations.
		Drilling Parameters & Directional Drilling: Explain solids control and oil- based mud (OBM) considerations.

		Drilling Parameters & Directional Drilling: Explain weight on bit (WOB) considerations.
		Elements of the Directional Plot: Explain the intent/importance of plot details.
		Elements of the Directional Plot: Explain the plan view.
		Elements of the Directional Plot: Explain vertical section view.
		Elements of the Directional Plot: Explain wellpath and site legend details.
		Explain chemical and fluid slide enhancement.
		Explain factors affecting slide ability.
		Explain how a PDM (positive displacement motor) works and major mechanical assemblies.
62	Directional Drilling: Motor Theory	Explain micro doglegs and ledging when drilling with motors.
		Explain motor operating procedures and parameters.
		Explain reactive torque such as hole conditions and drill string design.
		Explain stabilizer use and effect on build rates.
		Identify & Explain bearing and housing types.
	Directional Drilling: Hole Cleaning	Explain clean up cycles.
63	and Cuttings Transport in	Explain helical cuttings path hole cleaning model in horizontal wells.
	Horizontal Wells	Explain LGS (low gravity solids) and solids control considerations.
66	Hoisting/Rig Floor: Derrick Climbing Systems	Demonstrate how to use equipment associated with personnel climbing systems (rig specific).
00		Explain how to inspect equipment associated with personnel climbing systems.
	Hoisting/Rig Floor: Manriding Winches & Belts	Demonstrate correct hand signals associated with operating manriding winch.
70		Demonstrate how to inspect manriding winch.
		Demonstrate how to inspect, wear & fasten manriding belt.
74	Hoisting/Rig Floor: Utility	Demonstrate correct hand signals associated with operating utility winch.
/1	Winches	Demonstrate how to safely operate and maintain utility winch.
72	Power Systems: Engine instrumentation	Explain the purpose of engine instrumentation.
70	Power Systems: Engine report	Demonstrate how to record engine gauge readings and maintain logs.
/3	and log book	Explain the purpose of record keeping.
74	Power Systems: Engine fluids	Demonstrate how to check engines fluids levels and add as required.
/4		Explain types of engine fluids and level requirements.
75	Power Systems: Engine fuel system	Demonstrate how to ensure pressure, filtration and line requirements will sustain engine operation.
		Explain pressures, filtration, and line inspection.

76	Power Systems: Engine cooling system	Explain how to check engine coolant level.
		Explain radiator and cooling fan inspection.
	Power Systems: Engine air intake	Demonstrate how to change air filters.
//	systems	Explain how to inspect air filters and intake differential pressures.
78	Circulating Systems: Low Pressure	Demonstrate valve alignment to transfer mud and mix chemicals in each pit.
	Mud System	Explain the layout of the pits including valve locations.
		Demonstrate how to change out expendables.
		Demonstrate how to isolate the valves.
70	Circulating Systems: High	Demonstrate how to monitor mud pumps during operating.
79	Pressure Mud System	Explain how to change out expendables.
		Explain the purpose and operation of mud pumps.
		Identify where valves are located.
		Demonstrate how to perform maintenance of a pulsation dampener.
80	Circulating Systems: Pulsation	Explain the operation and maintenance of a pulsation dampener.
	bumpenery bladder	Explain the purpose of a pulsation dampener.
		Demonstrate shale shaker maintenance.
	Circulating Systems: Shale shakers	Demonstrate how to adjust shaker screens.
		Demonstrate how to change shaker screens.
81		Explain how to adjust shaker screens.
		Explain how to change shaker screens.
		Explain shale shaker maintenance.
		Explain the purpose of a shale shaker.
		Demonstrate how to line up trip tank valves for filling or monitoring the hole.
82	Circulating Systems: Trip Tanks	Explain how to line up trip tank valves for filling or monitoring the hole.
		Explain the purpose of the trip tank.
		Demonstrate how to perform maintenance on the mud saver bucket.
02	Circulating Systems: Mud Saver	Demonstrate how to use the mud saver bucket.
05	Bucket	Explain the purpose of a mud saver bucket.
		Explain when to use the mud saver bucket.
		Demonstrate how to identify wear of the master bushings.
		Demonstrate how to perform maintenance of the master bushings.
0 /	Rotating System: Master Bushings	Demonstrate how to pull and set master bushings.
84		Explain how to identify wear of the master bushings.
		Explain how to perform maintenance of the master bushings.
		Explain the purpose of the master bushings.
85	Rotating System: Rotary Table	Demonstrate the maintenance procedures for the rotary table.

		Demonstrate the procedure for locking and working around.
		Explain the maintenance procedures for the rotary table.
		Explain the procedure for locking and working around.
		Explain the purpose of the rotary table.
	Well Control Equipment: BOP Handling Systems	Demonstrate proper sling application and attachment methods between lifting device and BOP equipment.
86		Explain JSA / Work Plan knowledge for each critical step.
		Explain proper application and use of BOP handling systems.
		Demonstrate how to connect the HCR valve, manual valve, coflex hose, for BOP and choke manifold.
		Demonstrate how to connect the kill line and check valve as designed.
		Demonstrate how to function test all BOP elements.
	Well Control Equipment: BOP Control System And Accumulator	Demonstrate how to identify that BOPE hydraulic lines meet OEM requirements and are connected and protected to ensure BOPE function as designed.
		Demonstrate how to install the Driller's and remote BOP control panels and function test same.
		Demonstrate that all valves and gauges are in good working condition and clearly marked as to their function.
		Demonstrate that reservoir is filled to proper fluid level with proper fluid.
		Demonstrate that the accumulator unit has the proper fluid volume capacity for the BOP application to which it is being connected.
87		Demonstrate that the BOP Control system and accumulator unit has the proper working pressure rating for the BOP equipment to be installed.
		Explain accumulator unit fluid volume capacity as related to the BOP equipment to be installed.
		Explain BOP Control system and accumulator unit working pressure rating as related to the BOP equipment to be installed.
		Explain how to connect the HCR valve, manual valve, coflex hose, for BOP and choke manifold.
		Explain how to function test all BOP elements.
		Explain how to install the Driller's and remote BOP control panels and function test same.
		Explain the designed arrangement for kill line and check valve.
		Explain the importance of the condition of valves and gauges and their identification.
		Explain the requirements for BOPE hydraulic lines.
88	Well Control Equipment: BOP Preventers & Fail Safe Valves	Demonstrate how to install new ring and wellhead gaskets.
		Demonstrate how to install bolt completely into the nut.

		Demonstrate how to select and install the appropriate ring gaskets in all connections.
		Demonstrate proper torque sequence to insure flange gap is even on all sides.
		Demonstrate that all BOP components have been inspected and certified in accordance with OEM specifications.
		Explain how to guide upper BOP sections onto lower sections.
		Explain how to install new ring and wellhead gaskets.
		Explain how to open the BOP doors and change pipe rams and blind rams.
		Explain OEM specifications and certification for BOP components.
		Explain the importance of always using new and appropriate ring gaskets in all connections.
		Explain the importance of having the proper flange gap on all sides.
		Explain the importance of why all bolts need to be engaged completely into the nut.
		Explain the proper assembly (stack-out) of all BOP components to be used per drilling program.
		Demonstrate how to connect the test lines and secure from test unit to BOP.
	Well Control Equipment: BOP Testing Equipment	Demonstrate how to open the BOP doors and change rams.
		Demonstrate that hydraulic lines are of proper pressure rating.
89		Demonstrate that the test unit is of adequate pressure rating to test the BOP.
		Explain how to connect the test lines and secure from test unit to BOP.
		Explain how to open the BOP doors and change rams.
		Explain test unit pressure requirements in relation to BOP testing.
		Explain the requirements for BOPE hydraulic lines.
		Demonstrate how to function test each valve.
	Well Control Equipment: Full Opening Safety Valve, Kelly cock valve, IBOP	Explain each tool, their function, storage position and location of each.
90		Explain the importance all wrenches for each safety valve are kept orderly and are readily available.
		Explain the importance of inspecting valve connections in accordance with drill string requirements.
91		Demonstrate how to visually inspect float valves for damage.
	Well Control Equipment: Float Valve	Demonstrate the installation of float valve in drill string.
		Explain how to visually inspect float valves for damage.
		Explain the installation of float valve in drill string.
92	Well Control Equipment: Diverter	Demonstrate a function test and operation of diverter and valves.

		Demonstrate the ability to configuration all components in diverter system including flow lines, valves, and sizing for the application per the drilling program.
		Explain a function test and operation of diverter and valves.
		Explain the configuration of all components in diverter system including flow lines, valves, and sizing for the application per the drilling program.
		Explain the purpose of a diverter system as opposed to a BOP.
		Demonstrate sizing and pressure rating of spools for wellhead and BOP equipment meet requirements of drilling program.
93	Well Control Equipment: Wellhead Adaptor Spools and	Demonstrate that flow lines are routed and secured at a location and distance to allow for flaring and/or fluid containment.
	Risers	Explain flow lines routing and anchoring for flaring and/or fluid containment.
		Explain sizing and pressure rating of spools for wellhead and BOP equipment per drilling program.
		Demonstrate how to ensure tool joint space out within the BOP are adequate and a vent open below the wellhead test plug is open.
		Demonstrate that appropriate ring gaskets are used for each flange.
	Well Control: Testing BOP: Pressure And Function Testing Of BOPs	Demonstrate the test sequence of valves and BOP's including identifying leaks and how to correct them.
94		Explain how to identify ring gaskets in relation to BOP flanges.
		Explain the test sequence of valves and BOP's including identifying leaks and how to correct them.
		Explain tool joint placement (space out) within the BOP and the purpose of venting below the test plug.
	Well Control: Testing BOP: Pressure And Function Testing Of BOPs Choke Manifold	Demonstrate how to function the valves to their fully open and closed positions and align for drilling operations.
		Demonstrate how to lubricate valves with the high pressure grease.
		Demonstrate how to test to rated pressures and durations and how to bleed off test pressure after test.
95		Explain how to test to rated pressures and durations and how to bleed off test pressure after test.
		Explain how to function the valves to their fully open and closed positions and align for drilling operations.
		Explain how to lubricate valves with the high pressure grease.
96	Well Control: Testing BOP: Pressure And Function Testing Of BOPs Kill and Choke line Valves	Demonstrate how to function the valves to their fully open and closed positions and align for drilling operations.
		Demonstrate how to lubricate valves with the high pressure grease.
		Explain how to test to rated pressures and durations and how to bleed off test pressure after test.

		Explain how to function the valves to their fully open and closed positions and align for drilling operations.
		Explain how to lubricate valves with the high pressure grease.
		Demonstrate how to function the valves to their fully open and closed positions and align for drilling operations.
		Demonstrate how to lubricate valves.
	Well Control: Testing BOP: Pressure And Function Testing Of BOPs Pressure Test Standpipe manifold	Demonstrate how to test to rated pressures and durations and how to bleed off test pressure after test.
97		Explain how to test to rated pressures and durations and how to bleed off test pressure after test.
		Explain how to function the valves to their fully open and closed positions and align for drilling operations.
		Explain how to lubricate valves.
		Explain when the different types of closed loop mud cleaning equipment are used.
103	Diesel pumps	Demonstrate the use and maintenance of diesel pumps.
		Explain the importance of rig fuel filtering system.
		Explain the use and maintenance of diesel pumps.
105	Contrifuent automa	Demonstrate how to prime and maintain a centrifugal pump.
105	Centrirugal pumps	Explain how to prime and maintain a centrifugal pump.
106	Diaphragm pumps	Demonstrate how to prime and maintain a diaphragm pump.
106		Explain how to prime and maintain a diaphragm pump.
	Valve types	Demonstrate how to operate low pressure and high pressure valves.
107		Explain the different types of valves used in mud systems and where each type is applicable.
108	Rotary swivel	Explain what a rotary swivel is and when it is used.
		Demonstrate how to store and transport tubulars.
	Tubulars: Tubular care and maintenance	Demonstrate how to clean and inspect connections during drilling and tripping operations.
		Explain how the slips and rotary bushing relate to the care of tubulars.
		Explain how to break in new tool joints.
112		Explain how to clean and inspect connections during drilling and tripping operations.
		Explain the different types of mechanical surface imperfections that should be monitored or prevented that could lead to failures.
		Explain the importance of breaking in new tool joints.
		Explain the importance of cleaning and inspection of tubular connections.
		Explain the procedures for storing and transporting tubulars.
		Explain why thread compound is used.

114	Tubulars: Make Up/ Break Out of	Demonstrate how to apply the required torque for different thread connections on all tubular, subs and drill bits.
114	Drilling Bits	Explain torque requirements for different thread connections on all tubular, subs and drill bits.
		Explain the importance of ensuring why all surface equipment (BOP, coil tubing lines, etc.) must be tested.
115	Completions: Coiled Tubing (CT)	Explain the possible consequence of coil tubing failure (bursts, whiplash, etc.).
		Demonstrate how to ensure tubing hanger lands appropriately on wellhead.
116	Completions: Completions string	Demonstrate the correct running order of completion tubulars and correct space-out with seal assembly.
		Explain the correct running order of completion tubulars and correct space-out with seal assembly.
		Explain the differences between handling tubing vs. drill pipe.
		Demonstrate the ability to PU BHA assembly of fishing tools and run in hole.
		Demonstrate how to POOH with fish engaged.
118	Fishing Equipment	Explain BHA assembly of fishing tools and knowledge of down-hole operations.
		Explain the procedure and precautions when POOH with fish.
		Domonstrate how to operate forklift
		Demonstrate now to operate forkint.
		Demonstrate how to operate forkint. Demonstrate the ability to perform rigging and determine lifting capacities for forklift.
119	Forklift Operations	Demonstrate how to operate forkint. Demonstrate the ability to perform rigging and determine lifting capacities for forklift. Demonstrate the inspection and general maintenance procedure for a forklift.
119	Forklift Operations	Demonstrate how to operate forkint. Demonstrate the ability to perform rigging and determine lifting capacities for forklift. Demonstrate the inspection and general maintenance procedure for a forklift. Explain how to operate forklift.
119	Forklift Operations	Demonstrate how to operate forkint. Demonstrate the ability to perform rigging and determine lifting capacities for forklift. Demonstrate the inspection and general maintenance procedure for a forklift. Explain how to operate forklift. Explain rigging and lift capacities for forklift.
119	Forklift Operations	Demonstrate how to operate forkint. Demonstrate the ability to perform rigging and determine lifting capacities for forklift. Demonstrate the inspection and general maintenance procedure for a forklift. Explain how to operate forklift. Explain rigging and lift capacities for forklift. Explain the inspection and general maintenance of forklift.
119	Forklift Operations	Demonstrate how to operate forkint. Demonstrate the ability to perform rigging and determine lifting capacities for forklift. Demonstrate the inspection and general maintenance procedure for a forklift. Explain how to operate forklift. Explain rigging and lift capacities for forklift. Explain the inspection and general maintenance of forklift. Calculate strokes required to bump the cement plug while displacing with rig pump.
119	Forklift Operations	Demonstrate how to operate forkint. Demonstrate the ability to perform rigging and determine lifting capacities for forklift. Demonstrate the inspection and general maintenance procedure for a forklift. Explain how to operate forklift. Explain rigging and lift capacities for forklift. Explain the inspection and general maintenance of forklift. Calculate strokes required to bump the cement plug while displacing with rig pump. Explain the characteristics and importance of a proper cement job.
119	Forklift Operations	Demonstrate now to operate forkint. Demonstrate the ability to perform rigging and determine lifting capacities for forklift. Demonstrate the inspection and general maintenance procedure for a forklift. Explain how to operate forklift. Explain rigging and lift capacities for forklift. Explain the inspection and general maintenance of forklift. Calculate strokes required to bump the cement plug while displacing with rig pump. Explain the characteristics and importance of a proper cement job. Monitor returns to surface and distinguish the difference between cement and drilling fluid.
119	Forklift Operations	Demonstrate how to operate forkint. Demonstrate the ability to perform rigging and determine lifting capacities for forklift. Demonstrate the inspection and general maintenance procedure for a forklift. Explain how to operate forklift. Explain rigging and lift capacities for forklift. Explain the inspection and general maintenance of forklift. Calculate strokes required to bump the cement plug while displacing with rig pump. Explain the characteristics and importance of a proper cement job. Monitor returns to surface and distinguish the difference between cement and drilling fluid. Rig-up cementing lines and line up valves/ transfer mud to cementing unit.
119	Forklift Operations	Demonstrate how to operate forkint. Demonstrate the ability to perform rigging and determine lifting capacities for forklift. Demonstrate the inspection and general maintenance procedure for a forklift. Explain how to operate forklift. Explain rigging and lift capacities for forklift. Explain the inspection and general maintenance of forklift. Calculate strokes required to bump the cement plug while displacing with rig pump. Explain the characteristics and importance of a proper cement job. Monitor returns to surface and distinguish the difference between cement and drilling fluid. Rig-up cementing lines and line up valves/ transfer mud to cementing unit. Demonstrate how to follow the plug and abandon program.
119	Forklift Operations	Demonstrate how to operate forkint. Demonstrate the ability to perform rigging and determine lifting capacities for forklift. Demonstrate the inspection and general maintenance procedure for a forklift. Explain how to operate forklift. Explain rigging and lift capacities for forklift. Explain the inspection and general maintenance of forklift. Calculate strokes required to bump the cement plug while displacing with rig pump. Explain the characteristics and importance of a proper cement job. Monitor returns to surface and distinguish the difference between cement and drilling fluid. Rig-up cementing lines and line up valves/ transfer mud to cementing unit. Demonstrate how to perform pressure testing after plug has cured.
119	Forklift Operations Cementing Other Operations: Plug & Abandon Well	Demonstrate how to operate forklift. Demonstrate the ability to perform rigging and determine lifting capacities for forklift. Demonstrate the inspection and general maintenance procedure for a forklift. Explain how to operate forklift. Explain rigging and lift capacities for forklift. Explain the inspection and general maintenance of forklift. Calculate strokes required to bump the cement plug while displacing with rig pump. Explain the characteristics and importance of a proper cement job. Monitor returns to surface and distinguish the difference between cement and drilling fluid. Rig-up cementing lines and line up valves/ transfer mud to cementing unit. Demonstrate how to follow the plug and abandon program. Demonstrate tripping after cement plug is set in place.
119	Forklift Operations Cementing Other Operations: Plug & Abandon Well	 Demonstrate how to operate forklift. Demonstrate the ability to perform rigging and determine lifting capacities for forklift. Demonstrate the inspection and general maintenance procedure for a forklift. Explain how to operate forklift. Explain rigging and lift capacities for forklift. Explain the inspection and general maintenance of forklift. Calculate strokes required to bump the cement plug while displacing with rig pump. Explain the characteristics and importance of a proper cement job. Monitor returns to surface and distinguish the difference between cement and drilling fluid. Rig-up cementing lines and line up valves/ transfer mud to cementing unit. Demonstrate how to follow the plug and abandon program. Demonstrate tripping after cement plug is set in place. Explain how to perform pressure testing after plug has cured.

		Explain tripping procedure after cement plug is set in place.	
122	Other Operations: Drillstem Test	Demonstrate the ability to perform drillstem test procedure and related operations.	
		Demonstrate how to make up and torque components of the drill stem test assembly.	
		Demonstrate safe tripping speeds and procedures in cased and open hole.	
		Explain how to make up and torque components of the drill stem test assembly.	
		Explain safe tripping speeds and procedures in cased and open hole.	
		Explain the drillstem test procedure and related operations.	
		Demonstrate how to determine the back-up tong line is sized and installed correctly.	
		Demonstrate how to identify cross-threaded pipe.	
		Demonstrate how to stab casing.	
123	Other Operations: Conductor and	Demonstrate visual inspection of casing threads for damage and cleanliness.	
123	Casings	Explain how to determine the back-up tong line is sized and installed correctly.	
		Explain how to identify cross-threaded pipe.	
		Explain how to stab casing.	
		Explain visual inspection of casing threads for damage and cleanliness.	
124	Other Operations: Casing	Demonstrate how to rig up and position stabbing board.	
124	Stabbing Board	Explain how to rig up and position stabbing board.	
		Demonstrate how to rig up the wireline sheaves, (in mast and V-door).	
	Other Operations: Logging	Demonstrate how to monitor well conditions during logging operation.	
		Demonstrate how to rig up packoff/lubricator assembly.	
125		Explain how to monitor well conditions during logging operation.	
125		Explain how to rig up the wireline sheaves, (in mast and V-door).	
		Explain the procedure for rigging up packoff assembly.	
		Explain well control shut in during wireline logging depending on type and length of packoff/lubricator assembly being used.	
126	Other Operations: Mud Characteristics	Demonstrate how to maintain correct mud properties mixing chemicals to mud as instructed by mud engineer.	
		Demonstrate how to manage aerated or if it is gas-cut mud.	
		Demonstrate how to monitor solids control equipment.	
		Demonstrate how to record mud weight, viscosity, and volumes.	
		Demonstrate the mixing of chemicals required for the operation.	
		Explain how to identify if mud is aerated or if it is gas-cut.	
		Explain how to record mud weight, viscosity, and volumes.	

		Explain how to utilize the different solids control equipment for mud filtration.
		Explain the basic chemicals needed for the operation.
		Explain the characteristics of drilling fluids & their purpose.
		Explain the importance of communicating mud properties and all fluid changes to rig personnel.
127	Other Operations: Mud Transfer	Demonstrate how to line up valves, hoses and hard piping for the mud system transfers.
		Demonstrate how to notify personnel of transfers, monitor mud volume sensors and re-set once completed.
		Explain the importance of communicating fluid transfers and resetting PVT system.
		Explain the process for mud system transfers.
128	Other Operations: Drill Water System	Demonstrate how to maintain adequate drill water.
		Explain the importance of maintaining adequate water volume for drilling operations.

No.	Functional competency	Description of competency
01		Demonstrate immediate response during coordinated drills (Including your assigned Muster Station(s) and location of your Lifeboat(s) (if applicable).
	Induction (Post Hire Corporate and Unit Specific)	Explain assigned roles and responsibilities according to the Emergency Response Plans or Station Bill.
		Explain the general duties of the Unit/Crew specific positions.
		Explain your company's position in regard to compliance with regulatory requirements (for applicable position).
		Explain your Company's specific Short Service Employee program (if applicable).
		Identify and explain the various components of the Rig or Unit.
		Provide evidence of completion of the Corporate and Unit Specific Induction/Orientation course.
		Demonstrate where you will find onboard reference resources for the ISM Code.
02	International Safety Management Code (ISM) - If applicable	Explain (in brief) the elements of the ISM code and their importance to ensure safe management and operation of ships and for pollution prevention.
		Explain the significance of ISM code and to which vessels it applies.
		Explain what DPA, his functions and importance thereof is.
		Explain the applicable local and flag state security requirements.
		expected response to it.
03	International Ship and Port	Explain the significance of the ISPS code.
	Facility Security Code (ISPS)	Identify who the SSO is and briefly explain the SSO's function onboard.
		Provide evidence of completion of the onboard ISPS course.
		where it is maintained.
		Describe your role and responsibilities in order to comply with company's QHSES policies.
	Quality, Health, Safety, Environment and Security (QHSES) Policy	Explain good housekeeping practices and personal hygiene practices in accordance with company policies.
04		Explain the company's QHSES policies (as applicable).
		Explain the objectives and the importance of active participation in the various meetings held onsite/onboard (Induction meeting, Pre-shift meeting, Weekly safety meeting, Risk Assessment/Pre-job meeting).
		Identify where you would find the company QHSES Policies.
05	HSE Local Regulations and Relevant International Standards	Explain the local HSE regulations (Standards, laws and regulations that apply to occupational health and safety).
06	Quality Safety & Management System	Demonstrate the ability to navigate the company specific Quality Safety & Management System.
		Demonstrate the ability to perform the assigned duties as per the station bill/emergency response plan.
07	Station Bill/Emergency Response	Demonstrate the correct donning, doffing and stowing of emergency PPE.
07	Plan and Emergency Drills	Describe all the emergency alarm sounds as well as the respective actions to take (H2S, Well Control, Fire Alarm, Abandon Alarm, Gas Alarm, Man overboard Alarm, Loss of Station Position etc.).

Annex-4	:	Competency	List related	l to	QHSE
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		Describe and identify the location of your muster point(s).				
		Describe the process to search and rescue personnel unaccounted for in an emergency situation.				
		Identify the various site specific emergency equipment (Portable fire extinguishers, fixed fire systems such as CO2, Life Boat, Life Raft, Rescue Boat, Escape Ladder etc.).				
		Demonstrate the assigned duties to be carried out during various emergencies/drills (for example: Fire Drill, Abandon Drill, Gas Drill, Man Overboard Drill, Man Down, Stability Drill, Well Control Drill, SOPEP Drill, Helpdesk Fire Drill, Blackout Drill).				
		Demonstrate the proper recording and completion of all emergency response training and drills.				
		Describe and identify the escape routes, markings, signage systems and lighting systems as applicable.				
		Describe and identify the location of all emergency alarm actuators.				
08	Emergency Preparedness and Response	Describe how to react to well control situations and how often well control drills are conducted.				
		Describe the rig (unit) emergency response abandonment and notificatio procedures.				
		Explain the assigned duties to be carried out during various emergencies/drills (for example: Fire Drill, Abandon Drill, Gas Drill, Man Overboard Drill, Man Down, Stability Drill, Well Control Drill, SOPEP Drill, Helpdesk Fire Drill, Blackout Drill).				
		Explain the oil spill emergency plan(s) (Shipboard Oil Pollution Emergency Plan/Spill Prevention Control and Countermeasures Plan).				
		Explain the site specific emergency responses, exercises and training plans for all major hazardous situations.				
	Risk Assessments (RA)	Demonstrate the ability to verify that risk control measurements are implemented and demonstrate how to assess their effectiveness.				
		Describe and demonstrate how safety critical equipment is tested and maintained.				
09		Describe how simultaneous operations (SIMOPS) are managed to ensure that risk control procedures are in place during the execution of related activities.				
		Describe the operational boundaries and performance standards of the safety critical equipment.				
		Describe the potential hazards on site and provide examples of what could trigger them and what could be their associated consequences.				
		Describe the process by which potential or unforeseen risks are communicated to management and affected employees.				
		Describe the process to systematically identify, evaluate, select and implement risk reducing controls.				
		Describe the roles and responsibilities of personnel participating in the risk assessment process.				
		Describe the site specific risk assessment process.				
		Explain adverse environmental conditions by which the unit should not operate and the alerting systems available on site.				
		Explain and demonstrate how to stop and secure work or tasks in case of any unforeseen or unplanned changes or hazards, and how to further assess risks associated with these changes or hazards.				
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		Explain how the interaction of major hazards within your unit has been considered during normal or simultaneous operations.				
		Explain how to apply the hazard recognition and risk assessment techniques and the ability to implement risk mitigation measurements and controls.				
		Explain the maintenance and control of risk assessment documents.				
		Explain when/if operations can continue when risk associated with simultaneous operations, inadequate equipment or lack of personnel are present.				
		Identify and describe the safety critical equipment on site.				
		Demonstrate control and execution of energy isolation.				
		Describe a scenario where electrical/ mechanical isolations are required.				
		Describe the objectives of energy isolation and why precautions are important.				
10	Permit To Work (PTW)/ Energy Isolations/L.O.T.O.	Describe what constitutes a critical lift and all the precautions that must be in place.				
		Explain how electrical/mechanical isolation would be confirmed safe to work on.				
		Explain the types of energy sources that could be released at the site and the precautions that need to be in place.				
	Behavioral Based Safety System (BBSS)	Demonstrate the corrective action/feedback process in the BBSS program for an observed unsafe action/behavior.				
		Demonstrate the process to record and track non conformities from BBSS Observations.				
		Describe the difference between an unsafe action/behavior and an unsafe condition.				
11		Describe the importance of reviewing past BBSS observations and behaviors at safety meetings.				
		Describe your role in the BBSS.				
		Explain the company's BBSS.				
		Demonstrate the ability to secure the current work area or operation before evacuating during an emergency or drill.				
		Demonstrates ability to ensure that the work area is clean and orderly, prior to and upon completion of the work, task or repairs.				
		Demonstrates ability to maintain and inspect hand and power tools in operationally safe condition, without any unauthorized modifications.				
		Explain the hazards associated with using defective or modified hand or power tools.				
12	General Housekeeping/Orderliness	Explain the importance of closing out hazardous work activities before evacuating the area for an emergency or drill.				
		Explain the importance of good housekeeping practices in the work areas and living quarters.				
		Explain why it is important to keep tools put away and the work place clean in case of an emergency.				
		Explain your role in the housekeeping practices in the work areas and living quarters.				

	Demonstrate cleaning and organizing the work area upon completion of the work, task, or repairs.								
		Explain procedures personnel should follow if they observe worksite and water pollutants during lifting operations.							
		Describe the company Environmental Management Plan (EMP).							
		Describe the location specific sensitivities of the receiving environment.							
12	Environmental Management	Describe the process for handling or discharging cuttings.							
13	Plan	Describe the process for maintaining environmental discharge or emission records and their location.							
		Describe the process for monitoring discharges and emissions.							
14	Ship Oil Pollution Emergency Plan (SOPEP)	Describe the spill kit contents and how to use them.							
		Describe the rig specific SPCC plan procedures to follow in case of a spill.							
		Demonstrate the ability to locate the SPCC Plan.							
		Demonstrate the ability to locate the Spill kit.							
		Describe the SPCC inspection process for the location and equipment before spud in.							
	Spill Prevention Control and Countermeasures Plan (SPCC)	Describe the spill kit contents and how to use them.							
15		Explain how the SPCC plan bridges to the operator's well site plan.							
		Explain the process or requirements of training on the SPCC elements.							
		Explain the reporting procedures in the event of a spill on or off the well site location.							
		Explain the SPCC containment system including the layout, need and maintenance.							
		Explain your role in a SPCC drill or an actual spill.							
		Describe the company waste management plan.							
	Waste Segregation	Describe the waste materials (either solid or liquid), and identify/categorize as one of the following: common waste, industrial waste, hazardous waste and recyclable materials.							
16		Describe what materials should be placed into the waste containers and why they need to be segregated.							
		Explain the continuous improvement of waste handling on the unit/location.							
		Explain the waste containers provided for common waste, industrial waste, hazardous waste and recyclable materials.							
		Describe the hazards associated while work is being conducted overhead.							
		Describe the main hazard areas/zones where dropped objects may occur.							
		Explain how potential dropped objects are identified and how they should be reported.							
		Explain how the restricted areas/zones are enforced.							
17	Dropped Objects Prevention	Explain precautionary measures required to avoid causing dropped objects and to protect personnel from those potential hazards.							
		Explain the importance of a daily/weekly/monthly/annual dropped objects prevention inspection program.							
		Explain why access should be restricted to all known dropped object areas/zones.							

		Demonstrate the ability to find the fall arrest or restraint gear/equipment's information tag.					
		Demonstrate the ability to select the proper size and type as well as the donning of, and correct usage, of fall arrest gear.					
		Demonstrate transferring from one location to another while maintaining 100 percent tie off while working at heights.					
		Describe the difference between fall arrest and fall restraint.					
		Describe the emergency equipment and procedures (rescue plan) when rescuing someone at heights.					
		Describe the general requirements of the fall protection.					
19	Fall Protection	Describe the limitations and the common misuse of fall arrest and restraint equipment.					
15		Describe the management of defective fall arrest equipment.					
		Describe the proper maintenance, cleaning, inspection (including documentation) and storage of fall arrest equipment.					
		Describe the proper use of ladders (fixed and portable) or scaffolds.					
		Describe the proper work procedures and communication using fall protection while working in an aerial lift platform (man-lift/work basket).					
		Describe the types of fall protection and fall arrest gear/equipment and how it is used.					
		Explain the different types of fall protection and fall arrest systems and how each of them work.					
		Explain the importance of maintaining the proper overhead anchorage point.					
		Explain who is authorized to operate lifting equipment.					
		Demonstrate proper hand and body placement when attaching the rigging to a load.					
		Demonstrate the ability to properly operate lifting equipment.					
		Demonstrate the ability to select the correct lifting equipment for the task at hand.					
		Demonstrate the proper use of tag lines attached to loads including proper positioning.					
		Demonstrate the verbal communications and hand signals used in lifting operations.					
20	Safe Use Of Lifting Equipment	Describe the basic work sequence/policy and precautions that must be in place prior to making a critical lift.					
		Describe the lifting equipment available on location.					
		Describe the maintenance, storage and inspection of all lifting equipment (rigging/slings/shackles, etc.).					
		Describe the proper installation and rigging of all permanent and temporary lifting points (anchor points, pad eyes, etc.).					
		Describe the proper use of tag lines attached to loads including proper positioning and quantity.					
		Describe the verbal communications and hand signals used in lifting operations.					
		Explain proper hand and body placement when attaching the rigging to a load.					
		Explain the importance of a spotter during blind lifting operations.					

		Explain the minimum number of personnel and special precautions to be used during critical lifting operations.					
		Explain the pre-lift plan and inspections process.					
		Explain the responsibilities of a rigger (banksman).					
		Explain what constitutes a critical lift.					
		Demonstrate the ability to properly utilize personnel lifting equipment.					
		Demonstrate the ability to select the proper personnel lifting equipment/device.					
		Demonstrate the inspection of personnel lifting equipment.					
		Describe safety precautions necessary for the use of personnel lifting devices.					
21	Lifting of Personnel	Explain conditions, authority, and hand signals necessary to stop personnel lifting operations.					
		Explain the importance of using load balance, weight tolerances, and environmental conditions before and during personnel transfer.					
		Explain the inspection of equipment necessary for lifting of personnel.					
		Explain the precautions and pre-lift requirements before personnel are transferred or lifted.					
22	Crane Safety	Describe the maintenance, storage and inspection of all lifting equipment (rigging/slings/shackles, etc.).					
		Demonstrate rigging practices for safe lifting and movement of tubulars and irregular shaped equipment/materials.					
		Demonstrate the hand signals used during winch operations.					
		Demonstrate the operation of a utility winch.					
		Describe the operational and safety responsibilities of a winch operator.					
23	Use and maintenance of utility	Describe the specific locations where utility winches are installed on the unit.					
	WINCH	Explain rigging practices for safe lifting and movement of tubulars and irregular shaped equipment/materials.					
		Explain the capacity and limitations of utility winches.					
		Explain the pre-use inspection steps required before operating a utility winch.					
		Explain the required maintenance for a utility winch and accessories.					
		Describe the company policy on determining the actual and potential risk of an incident or near miss.					
		Explain the company's policies/procedures for reporting an incident resulting in personal injury, equipment damage, a near miss or any potential hazard.					
25	Accident/Incident Investigation	Explain the importance of active participation in an incident investigation.					
		Explain the importance of following up and closing corrective actions.					
		Explain the processes used to identify incident causes.					
		Explain what a corrective action is and why it is being implemented.					
		Explain why facts are important to an incident investigation.					
	Chemical Handling & SDS (MSDS)	Demonstrate selection and correct use of PPE when handling chemicals in accordance with the SDS.					
26	(GHS)	Describe appropriate actions necessary in the event of exposure/contact with chemicals or spill.					

		Describe the health and environmental risks associated with chemicals used at the work site.					
		Describe the information contained in a SDS.					
		Describe the storage and segregation process for chemicals.					
		Explain the minimum requirements for labeling, documentation and packing of chemicals.					
		Explain what NORM is, where NORM occurs and explain the precautions to be taken to prevent exposure.					
		Explain where Safety Data Sheets (SDS) are located.					
		Describe and give examples of various equipment guards and their purpose.					
		Explain the hazards and precautions of working around moving (dynamic) equipment.					
27	Equipment Safety	Explain the hazards and precautions of working around rotating equipment.					
		Explain the hazards and precautions to take when working with or near low or high pressurized equipment.					
		Explain the importance of ensuring that proper fittings (hammer unions/quick connect/hydraulic fittings) are being used in piping, hoses and equipment.					
		Demonstrate the proper selection and usage (donning/doffing) of PPE.					
	Personal Protective Equipment (PPE)	Describe different types of PPE, appropriate selection, proper usage and its limitations for various work tasks.					
29		Describe the proper maintenance/care and storage of PPE in accordance with the manufacturer's instructions.					
		Explain your responsibility and the importance of wearing PPE that is appropriate for the work-task.					
		Demonstrate how to support a load when walking with various size loads					
		Demonstrate the ergonomic posture to take when physically lifting and setting a load.					
		Describe when mechanical lifting is preferred to manual lifting and why.					
	Manual Handling/Ergonomics/Posture	Describe where the force is concentrated on the spine when improperly lifting or setting a load.					
30		Explain the company's policy and procedures on the manual handling/lifting of materials.					
		Explain the importance of planning your path of movement prior to lifting and carrying a load.					
		Explain the proper manual lifting or setting techniques to prevent back injuries as well as the benefits of using mechanical lifting devices.					
		Explain the value of manually "testing a load" before attempting to lift the load.					
		Describe what constitutes a confined space entry.					
		Explain how environmental conditions can negatively impact working in a confined space.					
31	Confined Space Entry	Explain the company's policy on confined space entry.					
		Explain the hazards associated with a confined space.					
		Explain the importance of using atmospheric monitoring equipment in a confined space.					

I		Explain the procedures to take before entering a confined space.						
		Explain the procedures to take upon entering a confined space.						
		Explain the required PPE needed when working in a confined space.						
		Explain what a competent person is in the context of regulatory standards covering confined space entry.						
		Explain what a qualified person is in the context of regulatory standards covering confined space entry.						
		Explain what and how to identify a confined space and give some examples on your worksite.						
		Explain why it is important to continually monitor the atmosphere of a confined space.						
		Explain your role and responsibility during a confined space rescue operation.						
		Demonstrate the ability to recognize operational shut down point(s).						
		Describe actions to be taken to protect personnel during severe weather conditions.						
22	Severe Weather Conditions	Describe operations which may be impacted by severe weather and the actions taken to mitigate it.						
32		Describe the process to restart operations after a severe weather event.						
		Describe the process to secure the unit, before evacuating, when a sev weather alert has been issued.						
		Explain the company's policy and procedures to follow during a severe weather threat.						
		Demonstrate the use of portable fire extinguishers.						
		Describe the company's policies and procedures for fire prevention.						
		Describe the different types of portable fire extinguishers and their applications (Water, Carbon Dioxide and Dry Chemical).						
		Describe the engine shutdown procedure in the event of a gas release.						
		Describe the fire and gas detection systems, sensor locations and how they function.						
		Describe the fixed and/or portable systems used to detect the presence of Oxygen (O2), Hydrocarbon (HC) and Hydrogen Sulphide (H2S), etc.						
	Fire Provention Fire Fighting and	Describe the passive fire protection systems on the unit, including their location and rating.						
33	Fire Control and Gas/Fire Detection Equipment	Describe the process and documentation needed for inspecting and maintaining portable fire extinguishers.						
		Describe the process for inspecting, maintaining, testing and calibrating the fire and gas detection systems.						
		Describe the testing and regulatory requirements for portable fire extinguishers.						
		Describe the three elements to complete the fire triangle.						
		Describe the thresholds and the actions automatically initiated on detection of HC and/or H2S.						
		Explain the different levels of shutdown associated with the unit (if applicable).						
		Explain the rig/unit emergency action (response) plan for a fire event.						
		Explain the use of portable fire extinguishers.						

		Explain the process for monitoring occupational health exposures.					
	Occupational Health Plan	Explain the company occupational health protection plan.					
34		Explain the exposures (noise, vibration, heat, etc.) that are unacceptable					
		Explain the process to identify, set, control and verify the exposure limits that could prevent potential acute and or chronic health hazards.					
		Describe management of change and why it is important when conducting SIMOPS operations.					
	Simultaneous Operations	Describe what constitutes a SIMOPS Plan.					
35		Explain Stop Work Authority and who is responsible to initiate when a potential risk is present.					
		Explain the elements of the SIMOPS Plan.					
		Explain the summary of operational boundaries and the difference between proceed, proceed with caution and stop operations.					
		Describe your company's powered/manual tool policy.					
		Explain the importance of inspection, maintenance and storage of powered/manual tools.					
36	Powered/Manual Tools	Explain the importance of removing defective or altered powered/manual tools.					
		Explain the importance of using the proper powered/manual tool for the task at hand.					
		Explain the required PPE and safe procedures for operating powered/manual tools.					

Functional	Description of competency								
competency									
	Demonstrate how handover records are filed and maintained.								
	Demonstrate the ability to accurately complete the IADC Daily Drilling Report.								
	Demonstrate the ability to apply action items contained in the communication document (Alerts/Notifications/Best Practices) through closure.								
	Demonstrate the ability to communicate to all current operations.								
	Demonstrate the ability to complete a handover report, note and form.								
	Demonstrate the ability to order, receive, distribute and track inventory.								
	Demonstrate the ability to store inventory items including dangerous goods.								
	Demonstrate the execution and application of a management of change request.								
	Demonstrate the handover procedure.								
	Describe the personnel involved in the development, implementation and maintenance of written policy and procedure standards.								
	Describe where operational documentation is maintained.								
	Explain how each business unit will utilize the quality and control system.								
	Explain how written policy and procedure standards are implemented into the current workforce and new hire process.								
	Explain the Company policy and procedure for the handover process.								
	Explain the Company policy and procedures for the storage of inventory items including danger goods.								
	Explain the Company policy and procedures on operations and HSE communications.								
	Explain the Company policy on documentation control.								
	Explain the Company process for implementing and maintaining a bridging document.								
Document Control	Explain the Company process for issuing, distributing and responding to communication documents (Alerts/Notifications/Best Practices).								
	Explain the Company process for maintaining the daily drilling reports.								
	Explain the Company process to ensure that all drawings, diagrams and procedures are current.								
	Explain the Company's material inventory and parts list including the vendor's nomenclature (name) of the part.								
	Explain the Company's policies and procedures for quality control.								
	Explain the Company's policy and procedures on the completion of and distribution/filing of the IADC Daily Drilling Report.								
	Explain the Company's process for the development of written policy and procedure standards.								
	Explain the Company's policy and procedures for inventory management.								
	Explain the Company's policy for management of change.								
	Explain the Company's procedure for document tracking and retention.								
	Explain the Company's procedures for a management of change, including team member's roles and responsibilities.								
	Explain the documentation control procedure and which personnel are involved in the filing of								
	operational documentation.								
	Explain the importance of accurately completing the IADC Daily Drilling Report.								
	Explain the importance of effective document control.								
	Explain the importance of ensuring that handover reports are understood and signed off by outgoing and incoming personnel.								
	Explain the importance of handover reports.								
	Explain the importance of operations and HSE communications throughout the Company.								
	Explain what quality and control system is used by the Company.								

Annex-5 : Competency List related to Record Management

Explain who is responsible for completing the IADC Daily Drilling Report.							
Explain who is responsible for revising documentation and describe how to recognize the latest version.							
Explain who is responsible for updating the HSE policy and procedures and what the process is.							
Explain why proper review, approval and document control are essential parts of management of change requests.							

Annex-6 : Competency List related to Transport

Functional competency	Description of competency			
	Demonstrate the proper procedure to approach the helicopter when boarding and exiting the aircraft.			
	Describe the Company's helicopter transportation policy.			
	Describe the Company's motor vehicle policy.			
	Describe the emergency response procedures and equipment associated with helicopter operations.			
Transportation	Describe the importance of journey management (trip planning).			
	Describe the proper procedure to approach the helicopter when boarding and exiting the aircraft.			
	Describe what constitutes being fit for duty when operating a motor vehicle.			
	Explain the importance of a "walk around" inspection (fluids, fuel, tire pressure etc.) before entering a vehicle and putting it into motion.			
	Explain who is in total command of the helicopter and who will make decisions concerning the flight and personnel allowed onboard.			

Annex-7 : Competency Table: – Roustabout

Positi	on:		Roustabout			Competency level required		red	Proficiency Scale					GAP	Individual Development Plan		
							Requ	uired S	Score			Act	ual Sc	ore			
Item N		la No	Functional	Def	Description of competency	Awaren	Applica	Career	Advanc	Expert	Aware	Applica	Career	Advanc Ex	ovel		
Item N	0 000	IE INO	competency	Rei	Description of competency	1	2	nt	Level	5	1	2	nt	Level	5		
1	0	15		•	Demonstrate ability to ensure that deck personnel use safe lifting procedures (e.g., tag		2				1					1	
-		15	General Rigging HSE		lines, escape routes).		<u> </u>						ļ				
				•	Demonstrate correct use of personal protective equipment.		2				1					1	
					beinonstrate the ability to identify plinch points and explain proper body position.		2				1					1	
2	CO	17			Demonstrate how to properly utilize personnel lifting equipment.			ļ									
				•	Demonstrate how to select the proper personnel lifting equipment/device.		2				1		ļ				
				•	Explain conditions, authority, and hand signals necessary to stop personnel lifting		2				1					1	
			Personnel: Lifting Operations	•	Explain procedures for raising and lowering a personnel basket safely.		2	+			1		+			1	
				•	Explain the importance of load balance, weight tolerances, and environmental conditions		2				1					1	
					before and during personnel transfer.												
				•	Explain the precautions and pre-lift requirements applicable before personnel are		2				1					1	
3	CO	18	Offboard/Onboard Supply	•	Demonstrate how to properly utilize personnel lifting equipment.		2				1					1	
-			Boat Lifting Operations				-										
													ļ			-	
				:	Demonstrate now to select the proper personnel lifting equipment/device.		2				1					1	
				•	Explain conditions, authority, and hand signals necessary to stop personnel lifting		2	1			1					1	
					operations.												
				•	Explain the importance of load balance, weight tolerances, and environmental conditions		2				1					1	
					before and during personnel transfer.		2				1						
				•	transferred or lifted.		2									· '	
				٠	Demonstrate cleaning and organizing the work area upon completion of the work task or		2				1					1	
4	со	20	General		repairs.												
			Housekeeping/Orderliness		Explain procedures personnel should follow if they observe worksite and water pollutants		2	+			1					1	
				-	during lifting operations.		-										
_				٠	Demonstrate cleaning and organizing the work area upon completion of the work, task, or		2				1					1	
5	QHSE	12	General		repairs.												
			Housekeeping/Orderliness	•	Explain procedures personnel should follow if they observe worksite and water pollutants		2				1					1	
					during lifting operations.												
6	QHSE	20	Safe Use Of Lifting	٠	Demonstrate proper hand and body placement when attaching the rigging to a load.		2				1					1	
		-	Equipment		, , , , , , , , , , , , , , , , , , ,												
			Sate Use Of Lifting	•	Explain proper hand and body placement when attaching the rigging to a load.		2										
7	QHSE	21	Lifting of Personnel		Demonstrate the inspection of personnel lifting equipment.		2	-			1					1	
			J										:	2 1			

Maximum Score 44

Actual Score 22

22

Annex-8 : Competency Table: – Floorman 1/4

Position: Floorman				Competency level required	Proficiency Scale	GAP	Individual Development Plan
				Required Score	Actual Score		
No	Code No	Eurotional compotency	Description of competency	Awarene Applicati Career Advance Expert	Awarene Applicati Career Advance Expert		
NO	Code No	Functional competency	Description of competency	ss on Proficien d Level Level	ss on Proficien d Level Level		
1	CO 01	Crane Basics	 Demonstrate ability to follow the permit-to-work and lockout/tagout procedures require 			0	
			for crane operations.				
			 Describe the lifting equipment available on current location. 			0	
			 Describe the type(s) of crane(s) by name and type, found on current location. 			0	
2	CO 02	Rigger Basics	 Demonstrate ability to use all rigging hitches (e.g., basket, choker, vertical, bridle) needed for the current inh 			0	
			 Demonstrate adhering to the nermit-to-work for routine and non-routine rigging tasks, if 				
			applicable.			0	
			 Demonstrate correct and safe use of taglines attached to loads, including proper 				
			positioning and quantity.			0	
			 Demonstrate following the lift plan required for critical lift rigging tasks. 			0	
			 Demonstrate how to correctly rig a load according to its specific center of gravity. 			0	
			 Demonstrate the ability to control an area where lifting operations are being carried out. 			0	
			 Demonstrate the ability to correctly and safely connect/disconnect loads. 			0	
			 Demonstrate the ability to correctly secure cargo in various conditions. 			0	
			 Demonstrate the ability to find the center of gravity of a load. 			0	
			 Demonstrate the ability to select the appropriate rigging equipment for a specific job. 			0	
			Demonstrate the use of sling capacity tables.			0	
			 Determine and/or estimate weight of loads for the purpose of rigging safely. 			0	
			 Explain center of gravity as it relates to rigging. 			0	
			 Explain D/d ratio for wire rope sling. 			0	
			 Explain how the tension or loading increases as sling angles decrease, especially the rapid 			-	
			increase in tension that occurs when slings are used below 30 degrees.			0	
			 Explain the different methods in which a slings are rigged or attached to load. 			0	
			 Explain the effect of beating the choker legs down. 			0	
			 Explain the effect of bringing the legs of a vertical basket hitch inwards. 			0	
			• Explain the importance of the eye of a synthetic web and why it should never be used or				
			forced over a hook or pin.			0	
			 Explain the importance of using padding (protection over sharp edges). 			0	
			• Explain the risk of using wire rope clips (i.e., clamps) to fabricate wire rope slings eyes.			0	
			 Explain the use of push poles, if required by company policy. 			0	
			 Explain vertical and horizontal planes as they relate to rigging (e.g., how force is 			0	
			distributed based on the plane).			U	
			 Explain why a wire rope hand-tucked splice should not be used in a single vertical lift. 			0	
			• Explain why the chain sling must never be used when twisted, knotted, or whenever the				
			links bind and do not move freely.			U	
			 Explain why the eye of a wire rope sling should never be forced over a hook or pin. 			0	
			 Explain why the hook should not be inserted into one of the chain links. 			0	
			 Locate company policies and procedures that apply to rigging. 			0	
			 Select correct slings, or other similar lifting devices, according to size, weight, and 			0	
			configuration.			U	
3	CO 03	General Rigger Qualifications and	 Explain the basic rigger's role in ensuring safe lifting operations. 				
		Role				U	
			Explain the basic rigger's role in ensuring that all lifting gear is certified to company and			0	
			regulatory requirements.			U	
			 Explain who at the jobsite is authorized to use rigging hardware. 			0	
			List the recommended qualifications, experience, and training necessary to be able to rig				
			load (see API RP 1e, 2d, latest edition).			Ŭ	

Annex-8 : Competency Table: – Floorman 2/4

No Code Non-rol Description of Complements Description of Complements Non-rol Description of Complements Non-rol Non-rol <th< th=""><th>Posi</th><th>ition:</th><th>Floor</th><th>rman</th><th></th><th>C</th><th>ompete</th><th>ncy leve</th><th>l required</th><th></th><th></th><th>Prof</th><th>iciency S</th><th>Scale</th><th></th><th>GAP</th><th>Individual Development Plan</th></th<>	Posi	ition:	Floor	rman		C	ompete	ncy leve	l required			Prof	iciency S	Scale		GAP	Individual Development Plan
No. Encicipant competency Participant competency Par							Rec	uired So	core			Ac	tual Sco	re			
	No	Code	No	Eunctional competency	Description of competency	Awarene	Applicati	Career	Advance	Expert	Awarene	Applicati	Career	Advance	Expert		
⁶ D0 66 General ligging buckless individual or anti-discuss of region of ligging of lightmass of ligging lightmass of lightmass of ligging lightmass of		cout		runctional competency	Description of competency	SS	on	Proficien	d Level	Level	SS	on	Proficien	d Level	Level		
Information configuration: configurat	4	CO	04 0	General Rigging Hardware	 Describe and explain sling manufacturers' recommendations for safe slinging 											0	
 besche ihe propre installation and rigger of all permanent and trepport yolition grants. Besche ihe propre installation and rigger of all permanent and trepport positioning and Besche installation and rigger of all permanent and trepport positioning and Besche installation and rigger of all permanent and trepport positioning and Besche installation and rigger of all permanent and trepport positioning and Besche installation and rigger of all permanent and trepport positioning and Besche installation and rigger of all permanent and trepport positioning and Besche installation and rigger of all permanent and trepport positioning and Besche installation and rigger of all permanent and trepport positioning and Besche installation and rigger of all permanent and trepport positioning and Besche installation and rigger of all permanent and trepport positioning and Besche installation and rigger of all permanent and trepport positioning and Besche installation and rigger of all permanent and trepport positioning and Besche installation, as and inspection of chain briefse. Besche installation, as and inspec			1	Information	configurations.												
introduction i					Describe the proper installation and rigging of all permanent and temporary lifting points											0	
					(anchor points, pad eyes, etc.).				ļ				ļ				
9 00 05 Rigging fractionance ingrigging language statuses in a single memory change system is using different language. 0					 Describe the proper use of tag lines attached to loads, including proper positioning and 											0	
					quantity.								ļ				
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Co					 Explain how the sling capacity changes when using different sling configurations. 				ļ				ļ			0	
Coal of Rigging Hardware Inspection & Coal of the manufacture's guideline, as applicable, for grange hardware. So Brigging Hardware Inspection & Coal of the match and any ever tools to prestionally side contellow, which any multiphone in page tools. Demonstrate proper application, use, and inspection of come-alongs. Demonstrate proper application, use, and inspection of host types. Demonstrate proper application, use, and inspection of host types. Demonstrate proper application, use, and inspection of host types. Demonstrate proper application, use, and inspection of host types. Demonstrate proper application, use, and inspection of host types. Demonstrate proper application, use, and inspection of host types. Demonstrate proper application, use, and inspection of host types. Demonstrate proper application, use, and inspection of host types. Demonstrate proper application, use, and inspection of host types. Demonstrate proper application, use, and inspection of protection elses. Demonstrate proper application, use, and inspection of protection elses. Demonstrate proper application, use, and inspection of protection elses. Demonstrate proper application, use, and inspection of protection elses. Demonstrate proper application, use, and inspection of protection elses. Demonstrate proper application, use					 Explain how to interpret manufacturer's guidelines for rigging hardware. 											0	
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					 Demonstrate proper application, use, and inspection of eye bolt types. 											0	
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					 Demonstrate proper application, use, and inspection of plate clamps. Demonstrate proper application, use, and inspection of shackles types. 												
					Demonstrate proper application, use, and inspection of snackles types.		+										
Construction of the proper application, use, and inspection of web sings. Demonstrate proper application, use, and inspection of wire rope slips. Demonstrate proper application, use, and inspection of wire rope slips. Demonstrate the proper application, use, and inspection of wire rope slips. Demonstrate the proper application, use, and inspection of wire rope slips. Demonstrate the proper application, use, and inspection of wire rope slips. Demonstrate the proper application, use, and inspection of wire rope slips. Demonstrate the proper application, use, and inspection of wire rope slips. Demonstrate the proper application, use, and inspection of wire rope slips. Demonstrate the proper application, use, and inspection of wire rope slips. Demonstrate the proper application, use, and inspection of wire rope slips. Demonstrate the proper application, use, and inspection of wire rope slips. Demonstrate the proper application, use, and inspection of wire rope slips. Demonstrate the proper application, use, and inspection of wire rope slips. Demonstrate the proper application, use, and inspection of wire rope slips. Demonstrate the proper application, use, and inspection of wire rope slips. Demonstrate the proper application of were roots and where records are kept for each item. Identify appropriate tools and materials for the purpose of performing preventive maintenance and minor adjustments. Co 10 General Crane Operator Qualifications and Role Co 10 General Crane Operator Step Work Authority when you observe and report any fuld leaks from the crane that could be contaminating the work environment and affecting safe operatons. Explain not stop Work Authority when you observe an unsafe at during lifting operations. Explain the importance personal protective equipment required for crane/lifting operations. Identify the appropriate personal protective equipment required for crane/lifting operations. Identify the appr					 Demonstrate proper application, use, and inspection of spreader bars. Demonstrate proper application, use, and inspection of turphuckles types 											0	
 Demonstrate proper application, use, and inspection of wire rope clips. Demonstrate proper application, use, and inspection of wire rope clips. Demonstrate proper application, use, and inspection of wire rope clips. Demonstrate proper application, use, and inspection of wire rope clips. Demonstrate proper application, use, and inspection of wire rope clips. Demonstrate proper application, use, and inspection of wire rope clips. Demonstrate proper application, use, and inspection of wire rope clips. Demonstrate proper application, use, and inspection of wire rope clips. Demonstrate proper application, use, and inspection of wire rope clips. Demonstrate proper application, use, and inspection of wire rope clips. Demonstrate proper application, use, and inspection of wire rope clips. Demonstrate proper application, use, and inspection of wire rope clips. Demonstrate proper application, use, and inspection of wire rope clips. Demonstrate proper application use, and inspection of wire rope clips. Demonstrate proper application use, and inspection of wire rope clips. Demonstrate proper application use, and inspection of wire rope clips. Demonstrate proper application use, and inspection of wire rope clips. Demonstrate proper application use, and inspection of wire rope clips. Demonstrate proper application use, and inspection of wire rope clips. Demonstrate proper application use, and inspection of wire rope clips. Demonstrate proper application use, and inspection of wire rope clips. Demonstrate proper application use, and inspection of wire rope clips. Demonstrate proper applications and Role Co 10 General Crane Operation HSE Explain why personnel should observe an unsafe at during lifting operations. Explain your Stop Work Authority when you observe an unsafe at during lift					Demonstrate proper application, use, and inspection of turnbuckles types.											0	
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6 CO 06 General Crane Operator Qualifications and Role Explain the importance of designating one person to give correct hand signals. Image: Construction of personal protective equipment required for crane/lifting operations. Image: Construction of personal protective equipment required for crane/lifting operations. Image: Construction of personal protective equipment required for crane/lifting operations. Image: Construction of personal protective equipment required for crane/lifting operations. Image: Construction of personal protective equipment required for crane/lifting operations. Image: Construction of personal protective equipment required for crane/lifting operations. Image: Construction of personal protective equipment required for crane/lifting operations. Image: Construction of personal protective equipment required for crane/lifting operations. Image: Construction of personal protective equipment required for crane/lifting operations. Image: Construction of personal protective equipment required for crane/lifting operations. Image: Construction of personal protective equipment required for crane/lifting operations. Image: Construction of personal protective equipment required for crane/lifting operations. Image: Construction of personal protective equipment required for crane/lifting operations. Image: Construction of personal protective equipment required for crane/lifting operations. Image: Construction of personal protective equipment required for crane/lifting operations. Image: Construction of personal protective equipment required for crane/lifting operations. Image: Construction of personal protective equipment required for crane/lifting operations. <td></td> <td></td> <td></td> <td></td> <td>Demonstrate proper application, use, and inspection of wire rope clips.</td> <td></td> <td>0</td> <td></td>					Demonstrate proper application, use, and inspection of wire rope clips.											0	
Explain the lifting gear color-coding system and how records are kept for each item. Explain the lifting gear color-coding system and how records are kept for each item. Identify appropriate tools and materials for the purpose of performing preventive maintenance and minor adjustments. Co General Crane Operator Qualifications and Role T CO 10 General Crane Operation HSE Explain the importance of designating one person to give correct hand signals and responding appropriately to those hand signals. Explain why personel should observe and report any fluid leaks from the crane that could be contaminating the work environment and affecting safe operations. Explain your Stop Work Authority when you observe an unsafe act during lifting operations. Identify the appropriate personal protective equipment required for crane/lifting operations.					Demonstrate the proper application, use, and inspection of whe tope sillings. Demonstrate the proper application, use, and inspection of personnel lifting backats		+		+							0	
Explain the lifting gear color-coding system and how records are kept for each item. Identify appropriate tools and materials for the purpose of performing preventive maintenance and minor adjustments. Identify appropriate tools and materials for the purpose of performing preventive maintenance and minor adjustments. Identify appropriate tools and materials for the purpose of performing preventive maintenance and minor adjustments. Identify the crane operator's role in ensuring safe lifting operations. Explain the importance of designating one person to give correct hand signals and responding appropriately to those hand signals. Explain why personnel should observe and report any fluid leaks from the crane that could be contaminating the work environment and affecting safe operations. Explain your Stop Work Authority when you observe an unsafe act during lifting operations. Identify the appropriate personal protective equipment required for crane/lifting operations.					 Evaluation procedures to follow when defective rigging hardware is identified 											0	
- Identify appropriate tools and materials for the purpose of performing preventive maintenance and minor adjustments. -					 Explain the lifting gear color-coding system and how records are kept for each item. 											0	
6 CO 06 General Crane Operator Qualifications and Role Explain the crane operator's role in ensuring safe lifting operations. 0 0 7 CO 10 General Crane Operation HSE Explain the importance of designating one person to give correct hand signals and responding appropriately to those hand signals. 0 0 0 8 Explain why personnel should observe and report any fluid leaks from the crane that could be contaminating the work environment and affecting safe operations. 0 0 0 0 Explain your Stop Work Authority when you observe an unsafe act during lifting operations. 0					Identify appropriate tools and materials for the purpose of performing preventive												
6 CO 06 General Crane Operator Qualifications and Role Explain the crane operator's role in ensuring safe lifting operations. Image: Construction operator ope					maintenance and minor adjustments.											0	
Qualifications and Role 0 7 CO 10 General Crane Operation HSE • Explain the importance of designating one person to give correct hand signals and responding appropriately to those hand signals. • • • 0 <td< td=""><td>6</td><td>CO</td><td>06 0</td><td>General Crane Operator</td><td> Explain the crane operator's role in ensuring safe lifting operations. </td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></td<>	6	CO	06 0	General Crane Operator	 Explain the crane operator's role in ensuring safe lifting operations. 												
7 CO 10 General Crane Operation HSE • Explain the importance of designating one person to give correct hand signals and responding appropriately to those hand signals. •				Qualifications and Role	······································	11										0	
responding appropriately to those hand signals. 0 • Explain why personnel should observe and report any fluid leaks from the crane that could be contaminating the work environment and affecting safe operations. 0 0 • Explain your Stop Work Authority when you observe an unsafe act during lifting operations. 0 0 0 • Identify the appropriate personal protective equipment required for crane/lifting operations. 0 0 0	7	СО	10 0	General Crane Operation HSE	 Explain the importance of designating one person to give correct hand signals and 	1	İ										
 Explain why personnel should observe and report any fluid leaks from the crane that could be contaminating the work environment and affecting safe operations. Explain your Stop Work Authority when you observe an unsafe act during lifting operations. Identify the appropriate personal protective equipment required for crane/lifting operations. 					responding appropriately to those hand signals.	11										0	
be contaminating the work environment and affecting safe operations. Explain your Stop Work Authority when you observe an unsafe act during lifting operations. Identify the appropriate personal protective equipment required for crane/lifting operations.					 Explain why personnel should observe and report any fluid leaks from the crane that could 												
 Explain your Stop Work Authority when you observe an unsafe act during lifting operations. Identify the appropriate personal protective equipment required for crane/lifting operations. 					be contaminating the work environment and affecting safe operations.	11										U	
operations. 0 Identify the appropriate personal protective equipment required for crane/lifting operations. 0					 Explain your Stop Work Authority when you observe an unsafe act during lifting 		1						1				
Identify the appropriate personal protective equipment required for crane/lifting operations.					operations.	11										U	
operations.					 Identify the appropriate personal protective equipment required for crane/lifting 												
					operations.											U	

Annex-8 : Competency Table: – Floorman 3/4

Posi	tion:	Floorman		Co	ompeter	ncy leve	l required		Proficier	ncy Scale	GAP	Individual Development Plan
					Req	uired S	core		Actual	Score		
No	Code	e No Functional competency	Description of competency	Awarene	Applicati	Career	Advance	Expert	Awarene Applicati Car	eer Advance Expert		
	60			SS	on	Proficien	d Level	Level	ss on Prot	icien d Level Level		
0	0	15 General Rigging HSE	 Demonstrate ability to ensure that deck personnel use sare lifting procedures (e.g., tag lines, occase routes) 								0	
			Demonstrate correct use of personal protective equipment								0	
9	CO	17 Personnel: Lifting Operations	Demonstrate bow to properly utilize personnel lifting equipment.								0	
	00	1, Tersonnen Enting operations	 Demonstrate how to select the proper personnel lifting equipment/device. 								0	
			 Explain conditions, authority, and hand signals necessary to stop personnel lifting 									
			operations.								0	
			Explain the importance of load balance, weight tolerances, and environmental conditions								0	
			before and during personnel transfer.				ļ					
			 Explain the precautions and pre-lift requirements applicable before personnel are 								0	
10	0	19 Offboord (Onboord Supply Poot	transferred or lifted.				+					
10	co	Lifting Operations	Demonstrate now to property utilize personnel inting equipment.								0	
		Litting Operations	 Demonstrate how to select the proper personnel lifting equipment/device. 								0	
			 Describe the basic work sequence/policy followed prior to making a critical lift. 								0	
			 Explain conditions, authority, and hand signals necessary to stop personnel lifting 									
			operations.								0	
			• Explain the importance of load balance, weight tolerances, and environmental conditions								0	
			before and during personnel transfer.									
			 Explain the precautions and pre-lift requirements applicable before personnel are 								0	
11	<u> </u>	10 Company Specific Crane One	transferred or lifted.									
	0	Policies & Procedures	Lopiant why the nook should not be inserted into one of the chain links.								0	
12	CO	20 General Housekeeping/Orderliness	 Demonstrate cleaning and organizing the work area upon completion of the work, task, or 									
			repairs.								0	
			• Explain procedures personnel should follow if they observe worksite and water pollutants								0	
			during lifting operations.								0	
13	DL	01 Rig Move (Skidding/Walking):	 Explain the need to assign watchmen to important areas during transit. 								0	
		Skidding Rig with BOP Suspended										
14	DL	05 Rig Up: Unload and install matting	 Demonstrate the ability to recognize approved and certified lifting equipment. 								0	
15	Ы	07 Rig Lin: Spot & Assemble Shaker	Demonstrate ability to properly earth ground equipment									
	DL	Tanks, Intermediate Tanks, Suction	• Demonstrate ability to property earth ground equipment.								0	
		Tanks &/or Reserve Tanks									-	
16	DL	09 Spot & Assemble suitcases and lines	 Demonstrate ability to properly earth ground equipment. 								0	
17	DL	16 Rig Up: Pipe Handler Equipment	Demonstrate ability to correctly connect all hydraulic lines.				1				0	
18	DL	28 Rig Down: Fall Protection	Explain pin removal and associated hazards.									
19	DL	30 Rig Down: Transportation	Explain how to secure all lines, piping and physical objects to prevent hazards during								0	
- 26			transporting.				<u> </u>				Ŭ	
20	DL	31 Rig Down: Environmental	Explain, it applicable, the process for oil-based mud (OBM) rig clean up and containment.				<u> </u>				0	
21	DL	33 Vertical/Conventional Drilling: Rig	 Demonstrate now to measure, strap, & caliper all tubulars. 								0	
		Fauinment									U	
		Equipment	 Demonstrate how to check drilling fluids characteristics and measurement 				+				0	
			- Demonstrate new to check unling hards characteristics and medsalement.			1	<u> </u>				U U	

Annex-8 : Competency Table: – Floorman 4/4

Posi	tion:	Floc	orman		C	ompete	ncy leve	l require	d		Prof	ficiency	Scale		GAP	Individual Development Plan
						Red	quired Sc	ore			Ac	tual Sco	re			
No	Code	e No	Functional competency	Description of competency	Awarene ss	Applicati on	Career Proficien	Advance d Level	Expert Level	Awarene ss	Applicati on	Career Proficien	Advance d Level	Expert Level		
22	DL	36	Vertical/Conventional Drilling: Execution Of Drilling And Well Operations	Demonstrate how to make trips.											0	
23	DL	39	Vertical/Conventional Drilling: Pipe measurement, number and strapping of pipes	Demonstrate correct measuring points on all tubular, casings and tools.											0	
				 Explain how to correctly read a strapping tape. Explain how to properly number stands in derrick when TIH or POOH. 											0	
24	DL	42	Vertical/Conventional Drilling: Standpipe and Bleed Off Core	Demonstrate how to ensure all valves are in the "full open" or "closed" position.											0	
25	DL	71	Hoisting/Rig Floor: Utility Winches	 Demonstrate correct hand signals associated with operating utility winch. 											0	
26	DL	88	Well Control Equipment: BOP Preventers & Fail Safe Valves	Explain the importance of why all bolts need to be engaged comletely into the nut.											0	
27	QHSE	12	General Housekeeping/Orderliness	 Demonstrate the ability to secure the current work area or operation before evacuating during an emergency or drill. 											0	
				 Explain the hazards associated with using defective or modified hand or power tools. 				ļ				ļ	ļ		0	
				 Explain the importance of closing out hazardous work activities before evacuating the area for an emergency or drill. 											0	
				 Demonstrate cleaning and organizing the work area upon completion of the work, task, or repairs. 											0	
				 Explain procedures personnel should follow if they observe worksite and water pollutants during lifting operations. 											0	
28	QHSE	20	Safe Use Of Lifting Equipment	 Demonstrate proper hand and body placement when attaching the rigging to a load. 											0	
				 Demonstrate the proper use of tag lines attached to loads including proper positioning. 											0	
				 Explain proper hand and body placement when attaching the rigging to a load. 							1	1			0	
29	QHSE	21	Lifting of Personnel	Demonstrate the inspection of personnel lifting equipment.				1							0	
								```								

Maximum Scor 0

Actual Score 0

0

### Annex-9 : Competency Table: – Motorman 1/11

Position: Motorman		Co	ompete	ncy level req	uired		Proficie	ncy Scale	GAP	Individual Development Plan
			Rec	uired Score			Actua	l Score		
No Code No Functional competency	Description of competency	Awarene	Applicati	Career Adva	nce Expert	Awaren	Applicat Ca	reer Advance Expert		
		SS	on	Proficien d Le	vel Level	ess	ion Pr	oficie d Level Level		
¹ DL 01 Rig Move (Skidding/Walking): Skidding Rig with BOP Suspended	Explain the need to assign watchmen to important areas during transit.								0	
² DL 05 Rig Up: Unload and install matting boards	Demonstrate the ability to recognize approved and certified lifting eqiupment.								0	
³ DL 07 Rig Up: Spot & Assemble Shaker Tanks, Intermediate Tanks, Suction Tanks &/or Reserve Tanks	Demonstrate ability to properly earth ground equipment.								0	
⁴ DL 09 Spot & Assemble Suitcases and lines	<ul> <li>Demonstrate ability to inspect and tighten all hammer seal unions between suitcases to prevent fluid or air leaks.</li> </ul>								0	
	<ul> <li>Demonstrate ability to properly earth ground equipment.</li> <li>Demonstrate ability to creat suitesce level, in proper order and in line as per rig design.</li> </ul>								0	
5 DI 10 Rig Un: Spot & Rig un Rig Power	Demonstrate ability to properly install all electricity connections and fuel lines		1	<u>                                       </u>						
Package & Fuel Tank	Demonstrate ability to property instantial electricity connections and rule intes.		ļ						0	
	<ul> <li>Demonstrate ability to spot power package &amp; ruer tank level, in proper order and in line as per rig design</li> </ul>								0	
6 DI 14 Big LID: HPLI	Demonstrate the ability to rig up the HPI I system	<b> </b>	1				+		0	
7 DL 16 Rig Up; Pine Handler Equipment	Demonstrate ability to rig up the first system     Demonstrate ability to correctly connect all hydraulic lines		1						0	
8 DI 18 Rig Up: Rig Eloor	Demonstrate the ability to install & rig up winches and air tuggers		-						0	
DE 10 hig op. hig floor	<ul> <li>Explain how to install &amp; rig up winches and air tuggers.</li> </ul>		1						0	
9 DL 27 Big Down: Critical Steps	Demonstrate ability to ensure all equipment has been removed from location.								0	
¹⁰ DL 28 Rig Down: Fall Protection	<ul> <li>Explain pin removal and associated hazards.</li> </ul>		1						0	
	<ul> <li>Explain procedures for working around the cellar/well head.</li> </ul>	~~~~~~~~~~~	1				<u> </u>		0	
11 DL 30 Rig Down: Transportation	<ul> <li>Explain how to secure all lines, piping and physical objects to prevent hazards during</li> </ul>		1							
	transporting.								0	
12 DL 31 Rig Down: Environmental	Explain, if applicable, the process for oil-based mud (OBM) rig clean up and containment.		1						0	
13 DL 33 Vertical/Conventional Drilling: Rig	<ul> <li>Demonstrate how to measure, strap, &amp; caliper all tubulars.</li> </ul>		1							
Math, Well Head and BOP Control Equipment									0	
	<ul> <li>Demonstrate how to check drilling fluids characteristics and measurement.</li> </ul>								0	
14 DL 35 Vertical/Conventional Drilling: Automated Pipe Handling	<ul> <li>Demonstrate how to ensure that moving equipment does not interfere with other equipment/machinery - Simulataneous Operations.</li> </ul>								0	
	<ul> <li>Explain the importance of checking the equipment prior to use.</li> </ul>								0	
15 DL 36 Vertical/Conventional Drilling: Execution Of Drilling And Well Operations	<ul> <li>Demonstrate how to maintain an accurate pipe tally in relation to the well design.</li> </ul>								0	
operations	Demonstrate how to make trips.		1	tt					0	
	<ul> <li>Demonstrate correct measuring points on all tubular, casings and tools.</li> </ul>		1						0	
	<ul> <li>Explain how to correctly read a strapping tape.</li> </ul>		1						0	
	<ul> <li>Explain how to properly number stands in derrick when TIH or POOH.</li> </ul>								0	
16 DL 47 vertical/Conventional Drilling:	<ul> <li>Demonstrate the method for strapping and counting the drill pipe.</li> </ul>									
Picking up drilling assembly									U	
	<ul> <li>Explain the method for strapping and counting the drill pipe.</li> </ul>								0	
17 DL 51 Well Control: Riser/Diverter/ BOP	<ul> <li>Demonstrate how to install new wellhead gaskets.</li> </ul>		1						0	
(Run & Retrieve)	• Explain how to install new wellhead gaskets.								0	
18 DL 70 Hoisting/Rig Floor: Manriding Winches & Belts	Demonstrate correct hand signals associated with operating manriding winch.								0	
	<ul> <li>Demonstrate how to inspect manriding winch.</li> </ul>								0	
	<ul> <li>Demonstrate how to inspect, wear &amp; fasten manriding belt.</li> </ul>								0	

## Annex-9 : Competency Table: – Motorman 2/11

Posit	ion:	М	otorman		Co	ompete	ncy le	vel requi	red		Profici	ency Scale		GAP		Individual Development Plan
						Rec	quired	Score			Actu	al Score				
No	Cod	e N	o Functional competency	Description of competency	Awarene ss	Applicati on	i Careo Profici	er Advand ien d Leve	e Expert Level	Awaren ess	Applicat C ion Pi	areer Adva oficie d Le	nce Expert /el Level			
19	DL	7	1 Hoisting/Rig Floor: Utility Winches	<ul> <li>Demonstrate correct hand signals associated with operating utility winch.</li> <li>Demonstrate how to safely operate and maintain utility winch.</li> </ul>										0		
20	DL	7	2 Power Systems: Engine instrumentation	Explain the purpose of engine instrumentation.										0		
21	DL	7	3 Power Systems: Engine report and log book	Demonstrate how to record engine gauge readings and maintain logs.										0		
22	DI	7	A Device Customer Facility fluids	Explain the purpose of record keeping.				_					_	0	┥┝	
22	DL	7	Power Systems: Engine fluids	Explain types of engine fluids and level requirements.		-		_		-			_	0	4 -	
24		7	Power Systems: Engine cooling	Explain pressures, intraction, and line inspection.		+		-	-	-			-	0		
	DL		system	Explain now to thete engine coolant level.										0		
25	DL	7	7 Power Systems: Engine air intake systems	Explain how to inspect air filters and intake differential pressures.										0		
26	DL	8	2 Circulating Systems: Trip Tanks	Demonstrate how to line up trip tank valves for filling or monitoring the hole.										0	] [	
				<ul> <li>Explain how to line up trip tank valves for filling or monitoring the hole.</li> </ul>										0		
				Explain the purpose of the trip tank.										0	4 6	
27	DL	8	3 Circulating Systems: Mud Saver Bucket	Demonstrate how to perform maintenance on the mud saver bucket.										0		
				Demonstrate how to use the mud saver bucket.										0		
				Explain the purpose of a mud saver bucket.										0		
				Explain when to use the mud saver bucket.				_					_	0		
28	DL	8	4 Rotating System: Master Bushings	Demonstrate how to perform maintenance of the master bushings.		+								0		
				Explain how to perform maintenance of the master bushings.										0		
29	DI	0	E Rotating System: Rotany Table	Demonstrate the maintenance precedures for the retary table		-		_	-	-			-	0		
	DL	0	S Rotating System. Rotary Table	Demonstrate the procedure for locking and working around										0		
				Explain the maintenance procedures for the rotary table		1			-					0		
				Explain the procedure for locking and working around.		+								0	~ ~	
				Explain the purpose of the rotary table.		1			-					0		
30	DL	8	7 Well Control Equipment: BOP Control System And Accumulator	<ul> <li>Demonstrate how to connect the HCR valve, manual valve, coflex hose, for BOP and choke manifold</li> </ul>										0	1 [	
			control system And Accumulator	Demonstrate how to connect the kill line and check value as designed		<u> </u>	-							0		
				<ul> <li>Demonstrate how to install the Driller's and remote BOP control panels and function test</li> </ul>										0	-	
				same.		+										
				<ul> <li>Explain now to connect the HCR valve, manual valve, coffex nose, for BOP and choke manifold.</li> </ul>										0		
				Explain how to install the Driller's and remote BOP control panels and function test same.										0	] [	
				Explain the designed arrangement foor kill line and check valve.										0		
31	DL	8	8 Well Control Equipment: BOP Preventers & Fail Safe Valves	Demonstrate proper torque sequence to insure flange gap is even on all sides.										0		
				<ul> <li>Explain how to open the BOP doors and change pipe rams and blind rams.</li> </ul>				1						0	] [	
				<ul> <li>Explain the importance of having the proper flange gap on all sides.</li> </ul>										0	1 [	
				Explain the importance of why all bolts need to be engaged comletely into the nut.		1								0	1 [	
32	DL	8	<ul> <li>Well Control Equipment: BOP</li> <li>Testing Equipment</li> </ul>	Demonstrate how to connect the test lines and secure from test unit to BOP.										0		
				Explain how to connect the test lines and secure from test unit to BOP.										0		
33	DL	9	D Well Control Equipment: Full Opening Safety Valve, Kelly cock	Explain each tool, their function, storage position and location of each.										0		
			vaive, IBOP	<ul> <li>Explain the importance all wrenches for each safety valve are kept orderly and are readily available.</li> </ul>										0		
				Explain the importance of inspecting valve connections in accordance with drill string requirements		1								0		
L				requirements.	I I	1	1		1	J L	. I			J L	J L	

## Annex-9 : Competency Table: – Motorman 3/11

Posit	ion:	Moto	orman		Com	petency lev	vel required		Pro	oficiency	Scale	GAP	Individual Development Plan
						Required	Score		A	Actual Sco	ore		
No	Code	e No	Functional competency	Description of competency	Awarene Ap	pplicati Caree	r Advance Expert	A	waren Applic	at Career	Advance Expert		
24					SS	on Proficie	en d Level Level		ess ion	Proficie	d Level Level		
34	DL	91 V	Vell Control Equipment: Float Valve	<ul> <li>Demonstrate how to visually inspect float valves for damage.</li> </ul>								0	
				Demonstrate the installation of float valve in drill string.								0	
				<ul> <li>Explain how to visually inspect float valves for damage.</li> </ul>								0	
25				Explain the installation of float valve in drill string.	_							0	
33	DL	93 V	vell Control Equipment: Wellnead	<ul> <li>Demonstrate sizing and pressure rating of spools for wellhead and BOP equipment meet</li> </ul>								0	
		A	daptor Spools and Risers	requirements of drilling program.				-					
				Explain sizing and pressure rating of spools for weilnead and BOP equipment per drilling								0	
36	DI	102 0	liosol numns	Demonstrate the use and maintenance of discel numes	-		+ +			-		0	
50	DL	105 L	vieser pumps	Demonstrate the use and maintenance of diesel pumps.     Evaluate the importance of rig fuel filtering system								0	
				Explain the use and maintenance of discel numps								0	
37	DI	105 0	ontrifugal numps	Explain the use and maintenance of dieser pumps.						-		0	
	DL	105 C	entinugai pumps	Evolution bow to prime and maintain a centrifugal pump.								0	
38	DI	106 0	lianhram numns	Demonstrate how to prime and maintain a centrifugal pump.			+ +			-		0	
	DL	100 L	apinani punps	Evolain how to prime and maintain a diaphram pump.				~ ~~~				0	
39	DI	108 R	otary swivel	Explain new to prime and maintain a dispinal particip.     Explain what a rotary swivel is and when it is used	-							0	
40	DI	100 R	ig LIn: Startun & Energize Rig	Demonstrate the ability to start up generators and VED/SCR systems			+ +					0	
		P	ower									0	
41	DL	112 T	ubulars: Tubular care and	Demonstrate how to clean and inspect connections during drilling and tripping operations.									
		n	naintenance	•								0	
				Explain how the slips and rotary bushing relate to the care of tubulars.								0	
				Explain how to break in new tool joints.								0	
				<ul> <li>Explain how to clean and inspect connections during drilling and tripping operations.</li> </ul>				~ ~~~				0	
				• Explain the different types of mechanical surface imperfections that should be monitored				-					
				or prevented that could lead to failures.								U	
				<ul> <li>Explain the importance of cleaning and inspection of tubular connections.</li> </ul>								0	
				<ul> <li>Explain the procedures for storing and transporting tubulars.</li> </ul>								0	
42	DL	119 F	orklift Operations	<ul> <li>Demonstrate how to operate forklift.</li> </ul>								0	
				<ul> <li>Demonstrate the ability to perform rigging and determine lifting capacities for forklift.</li> </ul>								0	
				<ul> <li>Demonstrate the inspection and general maintenance procedure for a forklift.</li> </ul>								0	
				<ul> <li>Explain how to operate forklift.</li> </ul>								0	
				<ul> <li>Explain rigging and lift capacities for forklift.</li> </ul>								0	
				Explain the inspection and general maintenance of forklift.						_		0	
43	DL	123 C	her Operations: Conductor and	<ul> <li>Demonstrate how to identify cross-threaded pipe.</li> </ul>								0	
		C	asings										
				<ul> <li>Demonstrate how to stab casing.</li> </ul>				~ ~~~				0	
				<ul> <li>Demonstrate visual inspection of casing threads for damage and cleanliness.</li> </ul>								0	
				Explain now to identify cross-threaded pipe.								0	
				<ul> <li>Explain now to stab casing.</li> <li>Explain visual increasion of accing threads for damage and cleanling.</li> </ul>								U	
				Explain visual inspection of casing threads for damage and cleanliness.								0	
				Demonstate now to indifically doequate unit water.      Evaluate the importance of maintaining adequate water volume for drilling exercitions								0	
44	יח	12 0	ig Lin: Botony system	Explain the importance of maintaining adequate water volume for drilling operations.	╢┝──┼╴		+ +	$\dashv \vdash$		+		0	
45		12 K	ig up. nuldiy system	Demonstrate how to oncure all valves are in the "full open" or "closed" periition	╢┝──┼─		+	$\dashv \vdash$				U	
	DL	42 V	tandning and Plood Off Ling	Demonstrate now to ensure an valves are in the full open of closed position.								0	
L		5	Lanupipe and bleed On Line			1			1	1			

# Annex-9 : Competency Table: – Motorman 4/11

Position: Motorman		C	ompete	ncy level r	require	ed		Pro	ficiency	Scale		GAP	Individual Development Plan
			Req	uired Sco	re			А	ctual Sco	ore			
No Code No Functional competency	Description of competency	Awarene	Applicati	Career A	dvance	Expert	Aware	n Applica	at Career	Advance	Expert		
		SS	on	Proficien	d Level	Level	ess	ion	Proficie	d Level	Level		
46 QHSE 01 Induction (Post-Hire Corporate and	<ul> <li>Demonstrate immediate response during coordinated drills (Including your assigned</li> </ul>											0	
Unit Specific)	Muster Station(s) and location of your Lifeboat(s) (if applicable).		+										
	<ul> <li>Explain assigned roles and responsibilities according to the Emergency Response Plans or Chatles Bill</li> </ul>											0	
	Station Bill.     Evaluate the general duties of the Unit/Crow specific positions			++-									
	Explain the general duties of the only crew specific positions.     Explain your company's position in regard to compliance with regulatory requirements		+										
	(for applicable position)											0	
	<ul> <li>Explain your Company's specific Short Service Employee program (if applicable)</li> </ul>		+						+			0	
	<ul> <li>Identify and explain the various components of the Rig or Unit.</li> </ul>		1						1			0	
	<ul> <li>Provide evidence of completion of the Corporate and Unit Specific Induction/Orientation</li> </ul>		+						1				
	course.											0	
47 QHSE 04 Quality, Health, Safety,	Describe your role and responsibilities in order to comply with company's QHSES policies.		1										
Environment and Security (QHSES)												0	
Policy													
	<ul> <li>Explain good housekeeping practices and personal hygiene practices in accordance with</li> </ul>											0	
	company policies.											0	
	<ul> <li>Explain the company's QHSES policies (as applicable).</li> </ul>											0	
	• Explain the objectives and the importance of active participation in the various meetings			Ι Τ									
	held onsite/onboard (Induction meeting, Pre-shift meeting, Weekly safety meeting, Risk											0	
	Assessment/Pre-job meeting).			ļļ.									
	<ul> <li>Identify where you would find the company QHSES Policies.</li> </ul>											0	
48 QHSE 05 HSE Local Regulations and Relevant	<ul> <li>Explain the local HSE regulations (Standards, laws and regulations that apply to</li> </ul>											0	
International Standards	occupational health and safety).							_					
49 QHSE 06 Quality Safety & Management	Demonstrate the ability to navigate the company specific Quality Safety & Management											0	
System	System.			$\vdash$				_					
50 QHSE 07 Station Bill/Emergency Response	<ul> <li>Demonstrate the ability to perform the assigned duties as per the station bill/emergency</li> </ul>											0	
Plan and Emergency Drills	response plan.		+										
	Demonstrate the correct donning, dotting and stowing of emergency PPE.											0	
	<ul> <li>Describe all the emergency alarm sounds as well as the respective actions to take (H25, Well Control Fire Alarm, Abandon Alarm, Cas Alarm, Man overboard Alarm, Loss of</li> </ul>											0	
	Station Desition etc)											0	
	<ul> <li>Describe and identify the location of your muster point(s)</li> </ul>		+									0	
	<ul> <li>Describe the process to search and rescue personnel unaccounted for in an emergency</li> </ul>		+						+				
	situation											0	
	<ul> <li>Identify the various site specific emergency equipment (Portable fire extinguishers, fixed</li> </ul>		+										
	fire systems such as CO2. Life Boat. Life Raft. Rescue Boat. Escape Ladder etc).											0	
51 QHSE 08 Emergency Preparedness and	Demonstrate the assigned duties to be carried out during various emergencies/drills (for								1				
Response	example: Fire Drill, Abandon Drill, Gas Drill, Man Overboard Drill, Man Down, Stability							[				0	
	Drill, Well Control Drill, SOPEP Drill, Helpdesk Fire Drill, Blackout Drill).												
	<ul> <li>Demonstrate the proper recording and completion of all emergency response training and</li> </ul>												
	drills.		1	L.								U	
	Describe and identify the escape routes, markings, signage systems and lighting systems											0	
	as applicable.												
	<ul> <li>Describe and identify the location of all emergency alarm actuators.</li> </ul>			ļļ.								0	
	<ul> <li>Describe how to react to well control situations and how often well control drills are</li> </ul>											0	
	conducted.			<u> </u>									
	<ul> <li>Describe the rig (unit) emergency response abandonment and notification procedures.</li> </ul>			<u>↓</u>								0	
	<ul> <li>Explain the assigned duties to be carried out during various emergencies/drills (for</li> </ul>												
	example: Fire Urili, Abandon Urili, Gas Urili, Man Overboard Urili, Man Down, Stability											U	
	Drill, well control Drill, SOPEP Drill, Helpdesk Fire Drill, Blackout Drill).		+										
	Explain the oil spill emergency plan(s) (shipboard Oil Pollution Emergency Plan/Spill  Provention Central and Countermeasures Plan)											0	
	<ul> <li>Evaluation control and councernicasures rightly.</li> <li>Evaluation the site specific emergency responses exercises and training plans for all major</li> </ul>		+	tt-									
	<ul> <li>Explain the size specific energency responses, excretes and training plans for all major hazardous situations.</li> </ul>											0	
		I L	1	) (			L	1		()		L	L

### Annex-9 : Competency Table: – Motorman 5/11

Position: Motorman		Co	ompet <u>er</u>	ncy level <u>req</u>	uired		Pro	ficiency	Scale		GAP	Individual Development Plan
			Req	uired Score			A	ctual Sco	ore			
No Code No Functional competency	Description of competency	Awarene	Applicati	Career Adva	nce Expert	Awarer	n Applica	t Career	Advance	Expert		
52 OHSE 09 Risk Assessments (RA)	Demonstrate the ability to verify that risk control measurements are implemented and	55	UII	Proncien d Le	Level	ess		Profice	d Level	Level		
	demonstrate how to assess their effectiveness.										0	
	<ul> <li>Describe and demonstrate how safety critical equipment is tested and maintained.</li> </ul>										0	
	<ul> <li>Describe how simultaneous operations (SIMOPS) are managed to ensure that risk control</li> </ul>						1				0	
	procedures are in place during the execution of related activities.											
	<ul> <li>Describe the operational boundaries and performance standards of the safety critical</li> </ul>										0	
	equipment.										****	
	<ul> <li>Describe the potential hazards on site and provide examples of what could trigger them and what could be their associated consequences</li> </ul>										0	
	<ul> <li>Describe the process by which potential or unforeseen risks are communicated to</li> </ul>											
	management and affected employees.										0	
	<ul> <li>Describe the process to systematically identify, evaluate, select and implement risk</li> </ul>						1				0	
	reducing controls.										0	
	<ul> <li>Describe the roles and responsibilities of personnel participating in the risk assessment</li> </ul>										0	
	process.											
	<ul> <li>Describe the site specific risk assessment process.</li> <li>Evaluate and demonstrate how to stop and converse work or tasks in case of any unforceson.</li> </ul>										0	
	<ul> <li>Explain and demonstrate now to stop and secure work of tasks in case of any unioreseen or upplanned changes or hazards, and how to further assess risks associated with these</li> </ul>										0	
	changes or hazards.										Ŭ	
	<ul> <li>Explain how the interaction of major hazards within your unit has been considered during</li> </ul>										0	
	normal or simultaneous operations.										U	
	<ul> <li>Explain how to apply the hazard recognition and risk assessment techniques and the</li> </ul>										0	
	ability to implement risk mitigation measurements and controls.											
	<ul> <li>Explain the maintenance and control of risk assessment documents.</li> </ul>										0	
	<ul> <li>Explain when/if operations can continue when risk associated with simultaneous operations, inadequate equipment or lack of percented are present.</li> </ul>										0	
	<ul> <li>Identify and describe the safety critical equipment on site.</li> </ul>						+	-			0	
53 QHSE 10 Permit To Work (PTW)/ Energy	Demonstrate control and execution of energy isolation.						1					
Isolations/L.O.T.O.	•,										0	
	<ul> <li>Describe a scenario where electrical/ mechanical isolations are required.</li> </ul>		ļ								0	
	<ul> <li>Describe the objectives of energy isolation and why precautions are important.</li> </ul>										0	
	<ul> <li>Explain how electrical/mechanical isolation would be confirmed safe to work on.</li> </ul>		+								0	
	<ul> <li>Explain the types of energy sources that could be released at the site and the precautions that need to be in place.</li> </ul>										0	
54 OHSE 11 Behavioral Based Safety System	Demonstrate the corrective action/feedback process in the BBSS program for an observed						+					
(BBSS)	unsafe action/behavior.										0	
()	Demonstrate the process to record and track non conformities from BBSS Observations.		1								0	
	<ul> <li>Describe the difference between an unsafe action/behavior and an unsafe condition.</li> </ul>				1		1				0	
	<ul> <li>Describe the importance of reviewing past BBSS observations and behaviors at safety</li> </ul>										0	
	meetings.										-	
	Describe your role in the BBSS.										0	
55 OHSE 12 Conoral Housekeeping/Orderlinese	<ul> <li>Explain the company's BBSS.</li> <li>Demonstrate the ability to cocure the current work area or operation before executing.</li> </ul>	-					+	+			0	
Grise 12 General Housekeeping/Ordeniness	during an emergency or drill										0	
	<ul> <li>Demonstrates ability to ensure that the work area is clean and orderly, prior to and upon</li> </ul>						1					
	completion of the work, task or repairs.										0	
	Demonstrates ability to maintain and inspect hand and power tools in operationally safe										0	
	condition, without any unauthorized modifications.		ļ	ļ								
	<ul> <li>Explain the hazards associated with using defective or modified hand or power tools.</li> </ul>										0	
	<ul> <li>Explain the importance of closing out hazardous work activities before evacuating the area for an emergency or drill</li> </ul>										0	
	For an energency of drill.     For an energency of drill.     For an energency of droug bousekeeping practices in the work processed living						+					
	<ul> <li>Explain the importance of good housekeeping practices in the work alleas and living quarters.</li> </ul>										0	
	Explain why it is important to keep tools put away and the work place clean in case of an		1	1			1					
	emergency.		<u> </u>								U	
	Explain your role in the housekeeping practices in the work areas and living quarters.										0	

## Annex-9 : Competency Table: – Motorman 6/11

Position: Motorman		С	ompete	ncy leve	el requir	ed		Pr	oficien	cy Scale		GAP	Individual Development Plan
			Rec	quired S	core				Actual	core			
No Code No Functional competency	Description of competency	Awaren	e Applicat	i Career	Advance	e Expert	Aware	en Applie	at Care	er Advand	e Expert		
		SS	on	Proficien	d Level	Level	ess	ion	Profi	cie d Leve	Level		
56 QHSE 13 Environmental Management Plan	<ul> <li>Describe the company Environmental Management Plan (EMP).</li> </ul>											0	
	<ul> <li>Describe the location specific sensitivities of the receiving environment.</li> </ul>											0	
	<ul> <li>Describe the process for handling or discharging cuttings.</li> </ul>											0	
	<ul> <li>Describe the process for maintaining environmental discharge or emission records and the information</li> </ul>											0	
	Describe the process for monitoring discharges and emissions					+							
57 OHSE 14 Ship Oil Bollution Emorron or Plan	Describe the process for monitoring discharges and emissions.				-			-	-		-	U	
(SOPEP)					ļ					_		0	
50 QHSE 15 Spill Prevention Control and Countermoscures Plan (SPCC)	Describe the rig specific SPCC plan procedures to follow in case of a spill.											0	
councernicasures rian (5) ccy	Demonstrate the ability to locate the SPCC Plan				+	+						0	
	Demonstrate the ability to locate the Snill kit				-	+						0	
	Describe the SPCC inspection process for the location and equipment before spud in.											0	
	<ul> <li>Describe the spill kit contents and how to use them.</li> </ul>			1	1	1		1				0	
	<ul> <li>Explain how the SPCC plan bridges to the operator's well site plan.</li> </ul>											0	
	<ul> <li>Explain the process or requirements of training on the SPCC elements.</li> </ul>				1			-				0	
	<ul> <li>Explain the reporting procedures in the event of a spill on or off the well site location.</li> </ul>			1								0	
	<ul> <li>Explain the SPCC containment system including the layout, need and maintenance.</li> </ul>											0	
	<ul> <li>Explain your role in a SPCC drill or an actual spill.</li> </ul>			1								0	
59 QHSE 16 Waste Segregation	<ul> <li>Describe the company waste management plan.</li> </ul>											0	
	• Describe the waste materials (either solid or liquid), and identify/categorize as one of the											0	
	following: common waste, industrial waste, hazardous waste and recyclable materials.											U	
	<ul> <li>Describe what materials should be placed into the waste containers and why they need to be segregated.</li> </ul>											0	
	<ul> <li>Explain the continuous improvement of waste handling on the unit/location.</li> </ul>			1	1	1						0	
	• Explain the waste containers provided for common waste, industrial waste, hazardous											0	
60 OUCE 47 Deserved Objects Deservetion	waste and recyclable materials.					-			-	-		0	
QHSE 17 Dropped Objects Prevention	<ul> <li>Describe the hazards associated while work is being conducted overhead.</li> </ul>											0	
	<ul> <li>Describe the main hazard areas/zones where dropped objects may occur.</li> </ul>											0	
	Explain now potential dropped objects are identified and now they should be reported.			+		+						0	
	Explain now the restricted areas/zones are enforced.     Explain process include areas/zones are enforced.				+	•							
	<ul> <li>Explain precautionary measures required to avoid causing dropped objects and to protect personnel from those notential bazards</li> </ul>											0	
	Explain the importance of a daily/weekly/monthly/annual dronned objects prevention			+	1	+							
	inspection program											0	
	<ul> <li>Explain why access should be restricted to all known dropped object areas/zones.</li> </ul>		-	+	1							0	
61 OHSE 19 Fall Protection	<ul> <li>Demonstrate the ability to find the fall arrest or restraint gear/equipment's information</li> </ul>				1			-					
	tag.											0	
	<ul> <li>Demonstrate the ability to select the proper size and type as well as the donning of, and</li> </ul>					1							
	correct usage, of fall arrest gear.											0	
	Demonstrate transferring from one location to another while maintaining 100 percent tie			1	1	1						0	
	off while working at heights.											U	
	<ul> <li>Describe the difference between fall arrest and fall restraint.</li> </ul>											0	
	Describe the emergency equipment and procedures (rescue plan) when rescuing someone											0	
	at heights.				1								
	<ul> <li>Describe the general requirements of the fall protection.</li> </ul>											0	
	<ul> <li>Describe the limitations and the common misuse of fall arrest and restraint equipment.</li> </ul>											0	
	<ul> <li>Describe the management of defective fall arrest equipment.</li> </ul>				1				_			0	
	<ul> <li>Describe the proper maintenance, cleaning, inspection (including documentation) and storage of fall arrest equipment.</li> </ul>											0	
	<ul> <li>Describe the proper use of ladders (fixed and portable) or scaffolds.</li> </ul>				1							0	
	Describe the proper work procedures and communication using fall protection while		1	1	T	Τ						0	
	working in an aerial lift platform (man-lift/work basket).				1							U	
	<ul> <li>Describe the types of fall protection and fall arrest gear/equipment and how it is used.</li> </ul>											0	
	• Explain the different types of fall protection and fall arrest systems and how each of them				1	1						0	
	work.				.J						_		
	<ul> <li>Explain the importance of maintaining the proper overhead anchorage point.</li> </ul>	I I		1	1							0	↓ └─────

### Annex-9 : Competency Table: – Motorman 7/11

Position: Motorman		Co	ompeter	ncy level i	require	ed		Pro	ficiency	Scale		GAP	Individual Development Plan
			Req	uired Sco	ore			A	ctual Sc	ore			
No Code No Functional competency	Description of competency	Awarene	Applicati	Career A	Advance	Expert	Awarer	n Applica	t Career	Advance Ex	apert		
62 OHSE 20 Safe Use Of Lifting Equipment	Explain who is authorized to operate lifting equipment	55		Proficien	u Levei	Level	ess		Profice		ever	0	
	Demonstrate proper band and body placement when attaching the rigging to a load							-				0	
	<ul> <li>Demonstrate the ability to properly operate lifting equipment.</li> </ul>		1							1		0	
	<ul> <li>Demonstrate the ability to select the correct lifting equipment for the task at hand.</li> </ul>		1			1		-		1		0	
	Demonstrate the proper use of tag lines attached to loads including proper positioning.		1			1		1	1			0	
	<ul> <li>Demonstrate the verbal communications and hand signals used in lifting operations.</li> </ul>		1									0	
	<ul> <li>Describe the basic work sequence/policy and precautions that must be in place prior to making a critical lift.</li> </ul>											0	
	<ul> <li>Describe the lifting equipment available on location.</li> </ul>											0	
	<ul> <li>Describe the maintenance, storage and inspection of all lifting equipment (rigging/slings/shackles, etc.).</li> </ul>											0	
	<ul> <li>Describe the proper installation and rigging of all permanent and temporary lifting points (archer points, and ever etc.)</li> </ul>											0	
	<ul> <li>Describe the proper use of tag lines attached to loads including proper positioning and guardities</li> </ul>		1			İ		1	1			0	
	quantity.												
	Describe the verbal communications and hand signals used in lifting operations.					<u> </u>						0	
	Explain proper hand and body placement when attaching the rigging to a load.     Explain the importance of a spotter during blind lifting operations							-	_			0	
	Explain the minimum number of personnel and special precautions to be used during		-										
	critical lifting operations											0	
	Explain the pre-lift plan and inspections process								-			0	
	<ul> <li>Explain the responsibilities of a rigger (banksman).</li> </ul>							-				0	
	<ul> <li>Explain what constitutes a critical lift.</li> </ul>					1						0	
63 QHSE 21 Lifting of Personnel	Demonstrate the ability to properly utilize personnel lifting equipment.							1				0	
	<ul> <li>Demonstrate the ability to select the proper personnel lifting equipment/device.</li> </ul>		1			1						0	
	<ul> <li>Demonstrate the inspection of personnel lifting equipment.</li> </ul>											0	
64 QHSE 22 Crane Safety	<ul> <li>Describe the maintenance, storage and inspection of all lifting equipment</li> </ul>		1					1					
	(rigging/slings/shackles, etc.).											0	
65 QHSE 23 Use and maintenance of utility	<ul> <li>Demonstrate rigging practices for safe lifting and movement of tubulars and irregular</li> </ul>											0	
winch	shaped equipment/materials.											U	
	<ul> <li>Demonstrate the hand signals used during winch operations.</li> </ul>											0	
	<ul> <li>Demonstrate the operation of a utility winch.</li> </ul>											0	
	<ul> <li>Describe the operational and safety responsibilities of a winch operator.</li> </ul>		ļ	ļ								0	
	<ul> <li>Describe the specific locations where utility winches are installed on the unit.</li> </ul>			ļ						ļ		0	
	<ul> <li>Explain rigging practices for safe lifting and movement of tubulars and irregular shaped</li> </ul>											0	
	equipment/materials.			ļ		ļ				ļļ			
	<ul> <li>Explain the capacity and limitations of utility winches.</li> </ul>			ļ								0	
	<ul> <li>Explain the pre-use inspection steps required before operating a utility winch.</li> </ul>			ļ						ļļ		0	
	<ul> <li>Explain the required maintenance for a utility winch and accessories.</li> </ul>	<u> </u>		<u> </u>		<u> </u>		-				0	
QHSE 25 Accident/Incident Investigation	<ul> <li>Explain the company's policies/procedures for reporting an incident resulting in personal injury, equipment damage, a near miss or any potential hazard.</li> </ul>											0	
	<ul> <li>Explain the importance of active participation in an incident investigation.</li> </ul>											0	
	<ul> <li>Explain the importance of following up and closing corrective actions.</li> </ul>											0	
	<ul> <li>Explain what a corrective action is and why it is being implemented.</li> </ul>									ļ		0	
	<ul> <li>Explain why facts are important to an incident investigation.</li> </ul>											0	

### Annex-9 : Competency Table: – Motorman 8/11

Position: Motorman		C	ompete	ncy leve	l require	ed		Profi	ciency S	cale	G/	AP	Individual Development Plan
			Rec	quired So	core			Act	ual Scor	e			
No Code No Functional competency	Description of competency	Awarene	e Applicati	i Career	Advance	Expert	Awaren	Applicat	Career A	dvance Exper	t		
		SS	on	Proficien	d Level	Level	ess	ion	Proficie	d Level Level	┥┝━		
<ul> <li>QHSE 26 Chemical Handling &amp; SDS (MSDS)</li> <li>(CUS)</li> </ul>	<ul> <li>Demonstrate selection and correct use of PPE when handling chemicals in accordance with the CDC</li> </ul>										(	С	
(613)	<ul> <li>Describe appropriate actions necessary in the event of exposure/contact with chemicals or</li> </ul>			+									
	<ul> <li>Describe appropriate actions necessary in the event of exposure/contact with chemicals of spill.</li> </ul>										(	С	
	<ul> <li>Describe the health and environmental risks associated with chemicals used at the work</li> </ul>						******						
	site.											5	
	<ul> <li>Describe the information contained in a SDS.</li> </ul>										(	)	
	<ul> <li>Describe the storage and segregation process for chemicals.</li> </ul>				ļ							2	
	<ul> <li>Explain the minimum requirements for labeling, documentation and packing of chemicals.</li> </ul>											)	
	<ul> <li>Explain what NORM is, where NORM occurs and explain the precautions to be taken to</li> </ul>										(	C	
	prevent exposure.				·								
68 OHSE 27 Equipment Safety	Explain where safety bata sheets (503) are located.			+								2	
co Quise 27 Equipment safety	Explain the hazards and precautions of working around moving (dynamic) equipment		+	+								2	
	<ul> <li>Explain the hazards and precautions of working around rotating equipment.</li> </ul>		+	+									
	Explain the hazards and precautions to take when working with or near low or high		-	1	1								
	pressurized equipment.											C	
	<ul> <li>Explain the importance of ensuring that proper fittings (hammer unions/quick</li> </ul>			1									
	connect/hydraulic fittings) are being used in piping, hoses and equipment.											)	
69 QHSE 29 Personal Protective Equipment	<ul> <li>Demonstrate the proper selection and usage (donning/doffing) of PPE.</li> </ul>											2	
(PPE)					ļ								
	<ul> <li>Describe different types of PPE, appropriate selection, proper usage and its limitations for</li> </ul>											5	
	various work tasks.		-	-	L						_		
	<ul> <li>Describe the proper maintenance/care and storage of PPE in accordance with the manufacture of a storage of PPE in accordance with the</li> </ul>										(	C	
	Euclain your responsibility and the importance of wearing DDE that is appropriate for the												
	<ul> <li>Explain your responsibility and the importance of wearing PPE that is appropriate for the work-task</li> </ul>										(	C	
70 OHSE 30 Manual	Demonstrate how to support a load when walking with various size loads			+								_	
Handling/Ergonomics/Posture	Demonstrate now to support a load when waiking with various size loads.										(	С	
	Demonstrate the ergonomic posture to take when physically lifting and setting a load.			1							- (	) )	
	Describe when mechanical lifting is preferred to manual lifting and why.		1	1	1						(	)	
	<ul> <li>Describe where the force is concentrated on the spine when improperly lifting or setting a</li> </ul>		1	1									
	load.											,	
	<ul> <li>Explain the company's policy and procedures on the manual handling/lifting of materials.</li> </ul>											)	
	<ul> <li>Explain the importance of planning your path of movement prior to lifting and carrying a</li> </ul>											5	
	load.												
	<ul> <li>Explain the proper manual lifting or setting techniques to prevent back injuries as well as</li> </ul>											C	
	the benefits of using mechanical lifting devices.										_		
71 OHSE 21 Confined Space Entry	Explain the value of manually testing a load before attempting to lift the load.		-	+			-					2	
Grise Si connieu space Entry	Explain how environmental conditions can negatively impact working in a confined space		+	+				1				 1	
	Explain now environmental conditions can negatively impact working in a commed space.     Explain the company's policy on confined space entry											, ,	
	<ul> <li>Explain the bazards associated with a confined space.</li> </ul>			1							(	2	
	<ul> <li>Explain the importance of using atmospheric monitoring equipment in a confined space.</li> </ul>			1							(	- D	
	<ul> <li>Explain the procedures to take before entering a confined space.</li> </ul>										(	C	
	<ul> <li>Explain the procedures to take upon entering a confined space.</li> </ul>										(	)	
	<ul> <li>Explain the required PPE needed when working in a confined space.</li> </ul>										(	2	
	<ul> <li>Explain what a competent person is in the context of regulatory standards covering</li> </ul>						1		T			5	
	confined space entry.										$\perp$	_	
	<ul> <li>Explain what a qualified person is in the context of regulatory standards covering confined</li> </ul>			1	1		1					5	
	space entry.				ļ								
	<ul> <li>Explain what and how to identify a confined space and give some examples on your unadeleter</li> </ul>			1			1				(	D	
	Worksite.			+							-		
	<ul> <li>Explain why it is important to continually monitor the atmosphere of a confined space.</li> <li>Evaluate your role and reconnecibility during a confined space receiption.</li> </ul>	<b> </b>		+							$+ \vdash$	2	
	<ul> <li>Explain your role and responsibility during a comment space rescue operation.</li> </ul>		1	1	1		1	1				,	

## Annex-9 : Competency Table: – Motorman 9/11

Position: Motorman		Co	ompeter	ncy level rec	uired		Prof	iciency Sca	e	GAP	Individual Development Plan
			Req	uired Score			Ac	tual Score			
No Code No Functional competency	Description of competency	Awarene	Applicati	Career Adv	ance Expert	Aware	en Applicat	Career Adv	ance Expert		
		SS	on	Proficien d Le	evel Level	ess	ion	Proficie d L	evel Level		
72 QHSE 32 Severe Weather Conditions	Demonstrate the ability to recognize operational shut down point(s).							ļ		0	
	Describe actions to be taken to protect personnel during severe weather conditions.							ļ		0	
	Describe operations which may be impacted by severe weather and the actions taken to									0	
	mitigate it.							ļ		· · · · · ·	
	Describe the process to restart operations after a severe weather event.		ļ	ļ				ļ		0	
	Describe the process to secure the unit, before evacuating, when a severe weather alert									0	
	has been issued.							ļ			
	Explain the company's policy and procedures to follow during a severe weather threat.						_			0	
73 QHSE 33 Fire Prevention, Fire Fighting and	<ul> <li>Demonstrate the use of portable fire extinguishers.</li> </ul>										
Fire Control and Gas/Fire Detection										0	
Equipment											
	<ul> <li>Describe the company's policies and procedures for fire prevention.</li> </ul>									0	
	<ul> <li>Describe the different types of portable fire extinguishers and their applications (Water, Carbon Disuida and Day Chamical)</li> </ul>									0	
	Carbon Dioxide and Dry Chemical).										
	Describe the engine shutdown procedure in the event of a gas release. Describe the fire and resident detection surfaces concer leastings and how they function										
	<ul> <li>Describe the fired and (or portable systems, sensor locations and now they function).</li> </ul>										
	<ul> <li>Describe the fixed and/or portable systems used to detect the presence of oxygen (02), Hydrocarbon (HC) and Hydrogen Sulphide (H2S) atc</li> </ul>									0	
	Describe the passive fire protection systems on the unit including their location and										
	<ul> <li>Describe the passive me protection systems on the unit, including their location and rating</li> </ul>									0	
	Describe the process and documentation needed for inspecting and maintaining portable										
	fire extinguishers									0	
	<ul> <li>Describe the process for inspecting maintaining testing and calibrating the fire and gas</li> </ul>										
	detection systems.									0	
	Describe the testing and regulatory requirements for portable fire extinguishers.									0	
	Describe the three elements to complete the fire triangle.									0	
	Describe the thresholds and the actions automatically initiated on detection of HC and/or		1								
	H2S.									0	
	Explain the different levels of shutdown associated with the unit (if applicable).									0	
	<ul> <li>Explain the rig/unit emergency action (response) plan for a fire event.</li> </ul>									0	
	<ul> <li>Explain the use of portable fire extinguishers.</li> </ul>									0	
74 QHSE 34 Occupational Health Plan	<ul> <li>Explain the company occupational health protection plan.</li> </ul>									0	
	Explain the exposures (noise, vibration, heat, etc.) that are unacceptable.									0	
⁷⁵ QHSE 35 Simultaneous Operations	<ul> <li>Describe management of change and why it is important when conducting SIMOPS</li> </ul>									0	
	operations.			ļ				ļ			
	Describe what constitutes a SIMOPS Plan.							ļ		0	
	Explain Stop Work Authority and who is responsible to initiate when a potential risk is									0	
	present.							ļļ			
	<ul> <li>Explain the elements of the SIMOPS Plan.</li> </ul>							ļ		0	
	<ul> <li>Explain the summary of operational boundaries and the difference between proceed,</li> </ul>									0	
	proceed with caution and stop operations.							ļ		-	
76 QHSE 36 Powered/Manual Tools	<ul> <li>Describe your company's powered/manual tool policy.</li> </ul>									0	
	<ul> <li>Explain the importance of inspection, maintenance and storage of powered/manual tools.</li> </ul>									0	
	<ul> <li>Explain the importance of removing detective or altered powered/manual tools.</li> </ul>							<u> </u>		0	
	Explain the importance of using the proper powered/manual tool for the task at hand.							<u> </u>		0	
	<ul> <li>Explain the required PPE and safe procedures for operating powered/manual tools.</li> </ul>						1			0	

## Annex-9 : Competency Table: – Motorman 10/11

Position:	Motor	rman		Co	ompete	ncy le <u>ve</u>	l requir	ed		Prof	icienc <u>y</u> s	Scale		GAP		Individual Development Plan
					Reo	uired So	ore			Ac	tual Sco	ore				
No Co	le No	Functional competency	Description of competency	Awarene	Applicati	Career	Advance	Expert	Awaren	Applicat	Career	Advance	Expert			
				ss	on	Proficien	d Level	Level	ess	ion	Proficie	d Level	Level			
77 RM	1 A1 Do	ocument Control	Demonstrate how handover records are filed and maintained.											0		
			Demonstrate the ability to apply action items contained in the communication document											0		
			(Alerts/Notifications/Best Practices) through closure.											0		
			<ul> <li>Demonstrate the ability to communicate to all current operations.</li> </ul>											0		
			Demonstrate the ability to complete a handover report, note and form.				ļ							0		
			<ul> <li>Demonstrate the ability to store inventory items including dangerous goods.</li> </ul>				ļ							0		
			<ul> <li>Demonstrate the execution and application of a management of change request.</li> </ul>		ļ		ļ					ļ		0		L
			<ul> <li>Demonstrate the handover procedure.</li> </ul>		ļ	ļ	ļ					ļ		0		
			Describe the personnel involved in the development, implementation and maintenance of											0		
			written policy and procedure standards.		ļ		ļ									
			Describe where operational documentation is maintained.				ļ	ļ						0		
			Explain how each business unit will utilize the quality and control system.		ļ		ļ					ļ		0		
			Explain how written policy and procedure standards are implemented into the current											0		
			workforce and new hire process.				ļ					ļ				
			Explain the Company policy and procedure for the handover process.				ļ							0		
			Explain the Company policy and procedures for the storage of inventory items including											0		
			dangerous goods.				ļ									
			Explain the Company policy and procedures on operations and HSE communications.											0		
			<ul> <li>Explain the Company policy on documentation control.</li> </ul>		<u> </u>		ļ							0		
			Explain the Company process for issuing, distributing and responding to communication											0		
			documents (Alerts/Notifications/Best Practices).	~~~~~~			<u> </u>									
			<ul> <li>Explain the Company's material inventory and parts list including the vendor's</li> </ul>											0		
			nomenciature (name) of the part.		+											
			Explain the Company's policies and procedures for quality control.											0		
			<ul> <li>Explain the company's process for the development of written policy and procedure step development.</li> </ul>											0		
			Standards.		+											
			Explain the company's policy and procedures for inventory management.		+			+		+				0		
			Explain the Company's policy for management of change.     Explain the Company's procedure for document tracking and retention		1									0		
			Explain the Company's procedure for a management of change, including team		+	+				+						h
			Explain the company's procedures for a management of change, including team     member's roles and responsibilities											0		
			Evolution the documentation control procedure and which personnel are involved in the		+	+				+						
			filing of operational documentation											0		
			Explain the importance of effective document control		+	+			~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	+						
			<ul> <li>Explain the importance of ensuring that handover reports are understood and signed off</li> </ul>		1			1								
			by outgoing and incoming personnel											0		
			<ul> <li>Explain the importance of handover reports</li> </ul>		1			1						0		
			Explain the importance of operations and HSE communications throughout the Company		1	1	1	1		1				0		
			Explain what quality and control system is used by the Company.		1	1	1			1		1		0		
			Explain who is responsible for revising documentation and describe how to recognize the		1	1	1	1		1		[]			~~~	[
			latest version.						1					0		1
			Explain who is responsible for updating the HSE policy and procedures and what is the		1	1	1			1		1				
			process.						1					0		1
			Explain why proper review, approval and document control are essential parts of				1			1				<i>c</i>		
			management of change requests.	1	1									0	1	1
			•						·			· · · · · · · · · · · · · · · · · · ·		· · · · · · · · · · · · · · · · · · ·		

## Annex-9 : Competency Table: – Motorman 11/11

Position: Motorman		Co	ompeter	ncy level requi	red		Pro	ficiency	Scale		GAP	Individual Development Plan
			Req	uired Score			Α	ctual Sc	ore			
No Code No Functional competency	Description of competency	Awarene ss	Applicati on	Career Advanc Proficien d Leve	e Expert Level	Aware ess	en Applica	t Career Proficie	Advance d Level	Expert Level		
78 SS 17 Transportation	<ul> <li>Demonstrate the proper procedure to approach the helicopter when boarding and exiting the aircraft.</li> <li>Describe the Company's helicopter transportation policy.</li> <li>Describe the Company's motor vehicle policy.</li> <li>Describe the company's motor vehicle policy.</li> <li>Describe the emergency response procedures and equipment associated with helicopter operations.</li> <li>Describe the importance of journey management (trip planning).</li> <li>Describe the proper procedure to approach the helicopter when boarding and exiting the aircraft.</li> <li>Describe what constitutes being fit for duty when operating a motor vehicle.</li> <li>Explain the importance of a "walk around" inspection (fluids, fuel, tire pressure etc.) before entering a vehicle and putting it into motion.</li> <li>Explain who is in total command of the helicopter and who will make decisions concerning the flight and personnel allowed onboard.</li> </ul>										0 0 0 0 0 0 0 0	
		Maxim	ium Sco	0		Actua	al Score	0			0	

#### Annex-10 : Competency Table: – Derrickman 1/2

Pos	ition: Der	Derrickman Competency level required Proficiency Scale								GAP	Ind	vidual	Develo	pmen	t Plan				
					Req	uired S	core			Ac	tual Sc	ore							
No	Code No	Functional competency	Description of competency	Awaren	Applicat	Career	Advance	Expert	Awaren	Applicat	i Career	Advance	Expert						
1				ess	ion	Proficie	d Level	Level	ess	on	Proficie	d Level	Level			<u> </u>	<b></b>	1	
1	CO 01	Crane Basics	<ul> <li>Demonstrate ability to follow the permit-to-work and lockout/tagout procedures required</li> </ul>											0					
			for crane operations.											0		—		-	
			Describe the lifting equipment available on current location.											0					
2	<u> </u>	Diagon Docion	Describe the type(s) of crane(s) by name and type, found on current location.				-					+		0	<u> </u>	+	+		
2	00 02	Rigger Basics	<ul> <li>Demonstrate ability to use all rigging nitches (e.g., basket, choker, vertical, bridle) needed for the surrout inh</li> </ul>											0					
			For the current job.											0					
			Demonstrate adhering to the permit-to-work for routine and non-routine rigging tasks, if     applicable											0					
			Demonstrate correct and safe use of taglines attached to loads including proper																
			<ul> <li>Demonstrate confect and sale use of tagines attached to loads, including proper positioning and quantity.</li> </ul>											0					1
			Demonstrate following the lift plan required for critical lift rigging tasks		1														
			Demonstrate how to correctly rig a load according to its specific center of gravity		<u> </u>					+	+					-		ł	
			Demonstrate the ability to control an area where lifting operations are being carried out											0					
			Demonstrate the ability to correctly and safely connect/disconnect loads											0					
			Demonstrate the ability to correctly secure cargo in various conditions		1		+			+	+			0					
			Demonstrate the ability to correctly sectre edge in various conditions:     Demonstrate the ability to find the center of gravity of a load					••••••		+		++		0					
			<ul> <li>Demonstrate the ability to select the appropriate rigging equipment for a specific iob.</li> </ul>		1		1							0				<u> </u>	
			Demonstrate the use of sling canacity tables		1		1				1			0		-			
			<ul> <li>Determine and/or estimate weight of loads for the purpose of rigging safely.</li> </ul>		1						+			0		-	+		
			<ul> <li>Explain center of gravity as it relates to rigging.</li> </ul>		1					1	1	1		0		-			
			• Explain how the tension or loading increases as sling angles decrease, especially the rapid		1											-	1	1	1
			increase in tension that occurs when slings are used below 30 degrees.											0					
			Explain the different methods in which a slings are rigged or attached to load.		1		1			1	1	1		0		-			
			• Explain the importance of the eye of a synthetic web and why it should never be used or							1						-	-	1	[
			forced over a hook or pin.											0					
			<ul> <li>Explain the importance of using padding (protection over sharp edges).</li> </ul>		1					1				0			-	1	
			Explain the use of push poles, if required by company policy.		1	[	1			1	1			0				1	
			<ul> <li>Explain vertical and horizontal planes as they relate to rigging (e.g., how force is</li> </ul>																
			distributed based on the plane).											0					
			<ul> <li>Locate company policies and procedures that apply to rigging.</li> </ul>											0					
			<ul> <li>Select correct slings, or other similar lifting devices, according to size, weight, and</li> </ul>																
			configuration.											0					1
3	CO 03	General Rigger Qualifications and	<ul> <li>Explain the basic rigger's role in ensuring safe lifting operations.</li> </ul>																
		Role												0				ļ	<u> </u>
			<ul> <li>Explain the basic rigger's role in ensuring that all lifting gear is certified to company and</li> </ul>																
			regulatory requirements.		ļ					ļ				0				ļ	ļ
			<ul> <li>Explain who at the jobsite is authorized to use rigging hardware.</li> </ul>											0				ļ	ļ
			<ul> <li>List the recommended qualifications, experience, and training necessary to be able to rig a</li> </ul>																
			load (see API RP 1e, 2d, latest edition).							ļ				0					<u> </u>
4	CO 04	General Rigging Hardware	<ul> <li>Describe the proper installation and rigging of all permanent and temporary lifting points</li> </ul>												1				1
		Information	(anchor points, pad eyes, etc.).							ļ				0				ļ	ļ
			<ul> <li>Describe the storage requirements for all rigging hardware (rigging/slings/shackles, etc.).</li> </ul>				1			ļ				0					<u> </u>
5	CO 05	Rigging Hardware Inspection &	<ul> <li>Demonstrate ability to maintain and inspect hand and power tools in operationally safe</li> </ul>												1				1
		Maintenance	condition, without any unauthorized modifications.					ļ				ļ		0			_	ļ	ļ
			<ul> <li>Explain procedures to follow when defective rigging hardware is identified.</li> </ul>		ļ	ļ				ļ				0		_	_	ļ	ļ
1			<ul> <li>Explain the lifting gear color-coding system and how records are kept for each item.</li> </ul>											0	1	1			1

### Annex-10 : Competency Table: – Derrickman 2/2

Posi	tion: Der	rrickman		Competency level requ Required Score						Prof	iciency	Scale	GAP	Ind	ividual D	evelop	oment Pl	an
					Req	uired S	core			Ac	tual Sco	ore						
No	Code No	Functional competency	Description of competency	Awaren	Applicat	Career	Advance	Expert	Awaren	Applicat	Career	Advance Expert						
			· · · ·	ess	ion	Proficie	d Level	Level	ess	on	Proficie	d Level Level			, ,			
6	CO 10	General Crane Operation HSE	• Explain why personnel should observe and report any fluid leaks from the crane that could															
			be contaminating the work environment and affecting safe operations.					ļ					0					
			<ul> <li>Explain your Stop Work Authority when you observe an unsafe act during lifting</li> </ul>															
7	60 45		operations.				-	<u> </u>					0					
<i>'</i>	CO 15	General Rigging HSE	<ul> <li>Demonstrate ability to ensure that deck personnel use safe lifting procedures (e.g., tag</li> </ul>										0					
			lines, escape routes).															
8	CO 17	Personnel: Lifting Operations	Demonstrate bow to properly utilize personnal lifting equipment										0					
Ŭ	0 1/	Personner. Litting Operations	Demonstrate how to select the proper personnel lifting equipment/device										0					
			Explain conditions, authority, and hand signals necessary to stop personnel lifting				+								++			
			operations.										0					
			<ul> <li>Explain the importance of load balance, weight tolerances, and environmental conditions</li> </ul>		1													
			before and during personnel transfer.										0					
			<ul> <li>Explain the precautions and pre-lift requirements applicable before personnel are</li> </ul>															
			transferred or lifted.										0					
9	CO 18	Offboard/Onboard Supply Boat	<ul> <li>Demonstrate how to properly utilize personnel lifting equipment.</li> </ul>															
		Lifting Operations			ļ								0					
			<ul> <li>Demonstrate how to select the proper personnel lifting equipment/device.</li> </ul>				ļ						0					
			<ul> <li>Describe the basic work sequence/policy followed prior to making a critical lift.</li> </ul>				ļ	ļ					0					
			<ul> <li>Explain conditions, authority, and hand signals necessary to stop personnel lifting</li> </ul>															
			operations.										0					
			<ul> <li>Explain the importance of load balance, weight tolerances, and environmental conditions</li> </ul>															
			Eveloie and during personnel transfer.															
			Explain the precautions and pre-lint requirements applicable before personnel are transferred or lifted										0					
10	CO 20	General Housekeeping/Orderliness	<ul> <li>Demonstrate cleaning and organizing the work area upon completion of the work task or</li> </ul>															-
	00 20	General Housekeeping/ordeniness	renairs										0					
			<ul> <li>Explain procedures personnel should follow if they observe worksite and water pollutants</li> </ul>		1		1								-			
			during lifting operations.										0					
11	QHSE 12	General Housekeeping/Orderliness	Demonstrate the ability to secure the current work area or operation before evacuating															-
			during an emergency or drill.										0					
			• Explain the hazards associated with using defective or modified hand or power tools.										0					
			• Explain the importance of closing out hazardous work activities before evacuating the area															
			for an emergency or drill.		ļ		ļ			ļ	ļ		0					
			<ul> <li>Demonstrate cleaning and organizing the work area upon completion of the work, task, or</li> </ul>															
			repairs.		ļ			ļ					0					
1			<ul> <li>Explain procedures personnel should follow if they observe worksite and water pollutants</li> </ul>															
12	01105 20	Cofe line Of lifeting Factions and	during inting operations.		1			<u> </u>					0		+ +			
12	QHSE 20	Sare Use Of Lifting Equipment	Demonstrate proper hand and body placement when attaching the rigging to a load.				-						0					
13	01165 24	Lifting of Demonsol	<ul> <li>Explain proper hand and body placement when attaching the rigging to a load.</li> <li>Demosstrate the inspection of personnel lifting equipment.</li> </ul>					<u> </u>				<u>├──</u>	0	-	-	-		
<u> </u>	UHSE 21	Litting of Personnel	Demonstrate the inspection of personnel lifting equipment.		1		1	<u> </u>	L				U				1	

Maximum Scc 0

Actual Score 0

0

# Annex-11 : Competency Table: – Assistant Driller 1/18

Position: Assistant Driller		C	ompete	ncy leve	el require	ed		Pro	ficiency S	Scale		GAP	Individual Development Plan
			Rec	quired So	core			A	ctual Sco	re			
No Code No Functional competency	Description of competency	Awarene	Applicat	i Career	Advance	Expert	Awaren	e Applicat	Career	Advanced	Expert		
		ss	on	Proficien	d Level	Level	SS	on	Proficient	Level	Level		
1 CO 01 Crane Basics	Describe the lifting equipment available on current location	1	2	t	4	5	1	2	3	4	5	0	
	Describe the type(s) of crane(s) by name and type, found on current location		+									0	
2 CO 02 Bigger Basics	<ul> <li>Demonstrate ability to use all rigging hitches (e.g., basket, choker, vertical, bridle) needed</li> </ul>			1				1	1				
	for the current iob.											0	
	<ul> <li>Demonstrate adhering to the permit-to-work for routine and non-routine rigging tasks, if</li> </ul>			1	1				1				
	applicable.											0	
	<ul> <li>Demonstrate correct and safe use of taglines attached to loads, including proper</li> </ul>												
	positioning and quantity.											0	
	<ul> <li>Demonstrate following the lift plan required for critical lift rigging tasks.</li> </ul>											0	
	<ul> <li>Demonstrate how to correctly rig a load according to its specific center of gravity.</li> </ul>											0	
	<ul> <li>Demonstrate the ability to control an area where lifting operations are being carried out.</li> </ul>					ļ						0	
	<ul> <li>Demonstrate the ability to correctly and safely connect/disconnect loads.</li> </ul>		ļ							ļ		0	
	<ul> <li>Demonstrate the ability to correctly secure cargo in various conditions.</li> </ul>					ļ						0	
	<ul> <li>Demonstrate the ability to find the center of gravity of a load.</li> </ul>					ļ			Ļ			0	
	<ul> <li>Demonstrate the ability to select the appropriate rigging equipment for a specific job.</li> </ul>											0	
	<ul> <li>Demonstrate the use of sling capacity tables.</li> </ul>			+						ļ		0	
	<ul> <li>Determine and/or estimate weight of loads for the purpose of rigging safely.</li> </ul>											0	
	<ul> <li>Explain center of gravity as it relates to rigging.</li> <li>Evaluation bow the tension or leading increases as cling angles degrees a conscially the rapid.</li> </ul>											0	
	<ul> <li>Explain now the tension of loading increases as sing angles decrease, especially the rapid increases in tension that accurs when clings are used holew 20 degrees.</li> </ul>											0	
	Evolution the different methods in which a slings are rigged or attached to load			1				-				0	
	<ul> <li>Explain the uncertaince of the eve of a synthetic web and why it should never be used or</li> </ul>			1									
	forced over a book or pin											0	
	<ul> <li>Explain the importance of using padding (protection over sharp edges).</li> </ul>			1								0	
	<ul> <li>Explain the use of push poles, if required by company policy.</li> </ul>		+	1					1			0	
	<ul> <li>Explain vertical and horizontal planes as they relate to rigging (e.g., how force is</li> </ul>		1	1									
	distributed based on the plane).											0	
	<ul> <li>Locate company policies and procedures that apply to rigging.</li> </ul>			1								0	
	<ul> <li>Select correct slings, or other similar lifting devices, according to size, weight, and</li> </ul>			1									
	configuration.											0	
³ CO 03 General Rigger Qualifications and Role	<ul> <li>Explain the basic rigger's role in ensuring safe lifting operations.</li> </ul>											0	
	<ul> <li>Explain the basic rigger's role in ensuring that all lifting gear is certified to company and</li> </ul>												
	regulatory requirements.		ļ	ļ								0	
	<ul> <li>Explain who at the jobsite is authorized to use rigging hardware.</li> </ul>					ļ						0	
	<ul> <li>List the recommended qualifications, experience, and training necessary to be able to rig a</li> </ul>												
	load (see API RP 1e, 2d, latest edition).			<u> </u>								0	
4 CO 04 General Rigging Hardware Information	<ul> <li>Describe the proper installation and rigging of all permanent and temporary lifting points</li> </ul>												
	(anchor points, pad eyes, etc.).											0	
5 CO OF Dississ Handware langesting & Maintenance	<ul> <li>Describe the storage requirements for all rigging hardware (rigging/slings/shackles, etc.).</li> </ul>												
5 CO 05 Rigging Hardware inspection & Maintenance	<ul> <li>Demonstrate ability to maintain and inspect hand and power tools in operationally safe condition, without any unputhorized medifications.</li> </ul>											0	
	Evolution, without any unauthorized mounications.			+									
	Explain procedures to follow when defective rigging nardware is identified.											0	
	<ul> <li>Explain the lifting gear color-coding system and how records are kept for each item.</li> </ul>											0	
6 CO 10 General Crane Operation HSE	Explain why personnel should observe and report any fluid leaks from the crane that could	H		1				-					
	<ul> <li>Explain why personnel should observe and report any huld leave notifit the that could be contaminating the work environment and affecting safe operations</li> </ul>			1									
	se containing the work environment and arecting sale operations.				1							0	
			1	1	1			1				0	
7 CO 15 General Rigging HSE	Demonstrate ability to ensure that deck personnel use safe lifting procedures (e.g., tag			1				1				·····	
	lines, escape routes).											0	
	<ul> <li>Demonstrate correct use of personal protective equipment.</li> </ul>			1		1						0	

# Annex-11 : Competency Table: – Assistant Driller 2/18

Positi	ion:	Assistant Drille	er		Competency level required							ficiency S	Scale		GAP	Ind	ividual I	Develo	pment	Plan
						Req	quired So	core			Α	ctual Sco	re			_	_			
No	Code	e No Func	tional competency	Description of competency	Awarene	Applicati	i Career	Advance	Expert	Awaren	e Applicati	Career	Advanced	Expert						
					55 1	on 2	Proficien	d Level	Level	ss 1	on 2	Proficient 3	Level 4	Level						
8	CO	17 Personnel: Lifti	ing Operations	Demonstrate how to properly utilize personnel lifting equipment.		<u> </u>									0		<b>—</b>	<u> </u>		
				Demonstrate how to select the proper personnel lifting equipment/device.											0					
				<ul> <li>Explain conditions, authority, and hand signals necessary to stop personnel lifting</li> </ul>																
				operations.											0				Ļ	
				<ul> <li>Explain the importance of load balance, weight tolerances, and environmental conditions</li> </ul>																
				before and during personnel transfer.		<u> </u>									0				+	
				Explain the precautions and pre-init requirements applicable before personnel are     transforred or lifted											0					
9	0	18 Offboard/Onbo	oard Supply Boat Lifting	Demonstrate how to properly utilize personnel lifting equipment														+	$\vdash$	
	00	Operations	ourd suppry sour circing												0					
				Demonstrate how to select the proper personnel lifting equipment/device.											0	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~		1		
				<ul> <li>Describe the basic work sequence/policy followed prior to making a critical lift.</li> </ul>											0					
				<ul> <li>Explain conditions, authority, and hand signals necessary to stop personnel lifting</li> </ul>																
				operations.		<u> </u>			ļ			ļ	ļ		0			<u> </u>	<b>↓</b> ↓	
				<ul> <li>Explain the importance of load balance, weight tolerances, and environmental conditions</li> </ul>																
				Evaluate the precautions and pre-lift requirements applicable before personnel are											0				<b>├</b> ───┼	
				transferred or lifted.											0					
10	CO	20 General House	keeping/Orderliness	<ul> <li>Demonstrate cleaning and organizing the work area upon completion of the work, task, or</li> </ul>				1			1				······		-	1		
				repairs.											0					
				• Explain procedures personnel should follow if they observe worksite and water pollutants															(	
				during lifting operations.		<u> </u>									0			<u> </u>	$\square$	
11	DL	01 Rig Move (Skid	lding/Walking): Skidding Rig	<ul> <li>Demonstrate how to secure the BOP for transit.</li> </ul>																
		with BOP Susp	ended	Evaluin the need to accign watchmen to important access during transit											0				┣━━━━┝	
12	DI	02 Big Move (Skid	ding/Walking): Location of Hole	Demonstrate ability to coach drill crews on how to be able to nosition rig on well center												_	<u> </u>	<u> </u>	+	
		Center	unity waiking). Location of hole	Semionstrate ability to coach and crews of now to be able to position ng on wen center.											0					
				<ul> <li>Demonstrate ability to utilize correct measuring methods and techniques to position rig</li> </ul>		1	1					1						1		
				on well center.											0					
13	DL	03 Rig Move (Skid	lding/Walking): Unload and	<ul> <li>Demonstrate ability to spot matting boards as per rig design.</li> </ul>																
		install matting	boards	• - · · · · · · · · · · · ·											0			<u> </u>	<b>—</b>	
14	DL	04 Rig Move (Skid	lding/Walking): Well Control	<ul> <li>Demonstrate the ability to install choke, flow, flare, and diverter lines.</li> </ul>																
15	DI	Equipment	and install matting boards	Demonstrate ability to ensure only approved and certified lifting equipment is utilized							+				0	-		<u> </u>	$\vdash$	
	DL	05 Nig Op. Onioad	and install matting boards	<ul> <li>Demonstrate ability to recognize approved and certified lifting equipment is duized.</li> </ul>		+	+				-	+								
				• • • • • • • • • • • • • • • • • • •											0					
16	DL	06 Rig Up: Spot &	Assemble Subtructure Base &	<ul> <li>Demonstrate ability to spot sub base on well center as per rig design.</li> </ul>															$\square$	
		Associated Bra	icing												0					
17	DL	07 Rig Up: Spot &	Assemble Shaker Tanks,	Demonstrate ability to inspect and tighten all hammer seal unions to equalizer and mud																
		Intermediate T	anks, Suction Tanks &/or	mixing lines.																
		Reserve fanks		Demonstrate ability to properly earth ground equipment											0				┢───┼	
				Demonstrate ability to shot mud tanks level in proper order and in line as per rig design				+							0			+	<u>├</u>	
18	DL	08 Rig Up; Spot M	lud Pumps & Assemble All	<ul> <li>Demonstrate the ability to spot mud pumps and rig up all associated nlumbing and</li> </ul>						-							-	<u> </u>	++	
		Suction Lines, F	Pressure Release Lines & Braces	operating lines.											0					
19	DL	09 Spot & Assemb	ole Suitcases and lines	Demonstrate ability to inspect and tighten all hammer seal unions between suitcases to		1														
				prevent fluid or air leaks.											0					
				<ul> <li>Demonstrate ability to properly earth ground equipment.</li> </ul>		ļ		ļ	ļ			ļ	ļļ		0			ļ		
				Demonstrate ability to spot suitcase level, in proper order and in line as per rig design.											0			1		

# Annex-11 : Competency Table: – Assistant Driller 3/18

Position:	: Assistant Driller		C	ompeter	ncy leve	el requir	ed		Prof	iciency	Scale		GAP	Individual Development Plan
			Required Score Awarene Applicati Career Advance Expert						Ac	tual Sco	re			
No Cor	de No Eunctional competency	Description of competency	Awarene	Applicati	Career	Advance	Expert	Awarene	Applicati	Career	Advanced Exper	t		
			ss	on	Proficien	d Level	Level	SS	on	Proficient	Level Leve			
20 DI	10 Dig Lip: Spot & Pig up Pig Dowor Dockago &	Demonstrate ability to properly install all electricity connections and fuel lines	1	2	t	4	5	1	2	3	4 5			
DL	Fuel Tank	Demonstrate ability to property instan an electricity connections and rule lines.											0	
		• Demonstrate ability to spot power package & fuel tank level, in proper order and in line as			1									
		per rig design.											0	
21 DL	11 Rig Up: Startup & Energize Rig Power	<ul> <li>Demonstrate the ability to start up generators and VFD/SCR systems.</li> </ul>											0	
22 DL	12 Rig Up: Assemble Rig Floor structural supports	<ul> <li>Demonstrate ability to install structual supports.</li> </ul>											0	
23 DL	13 Rig Up: Rotary system	<ul> <li>Demonstrate ability to rig up rotary and applicable drive system.</li> </ul>											0	
²⁴ DL	14 Rig Up: HPU	<ul> <li>Desmonstrate the ability to rig up the HPU system.</li> </ul>											0	
²⁵ DL	15 Rig Up: Energize Draw Works & Driller Control	<ul> <li>Demonstrate ability to function test the Draw Works operations and emergency shut</li> </ul>												
		down.			<u> </u>								0	
		<ul> <li>Explain Draw Works &amp; Drillers Console energizing procedures &amp; requirements.</li> </ul>			Į	ļ							0	
26 DL	16 Rig Up: Pipe Handler Equipment	<ul> <li>Demonstrate ability to correctly connect all hydraulic lines.</li> </ul>											0	
27 51		Explain the process for assembling derrick/mast, raising structure & equipment.					<u> </u>				<u> </u>		0	
27 DL	17 Rig Up: Derrick/Mast Assembly	Demonstrate the ability to perform the Pre-Raise Mast/Derrick Inspection.											0	
		Demostrate the ability to string up lines & blocks in the mast/derrick. Demostrate the process for eccempling derrick/mast_religing structure 8 equipment.											0	
		Desmonstrate the process for assembling demoky mast, raising structure & equipment.     Ensure derrick ladders are in proper peritien & stand pine connected											0	
		Ensure demok ladders are in proper position & stand pipe connected.      Explain the Pre-Paice Mast/Derrick Inspection											0	
28 DI	18 Big LID: Big Floor	Demonstrate the ability to install & rig up winches and air tuggers				-						_	0	
	10 mg op. mg 100	Explain how to install & rig up winches and air tuggers		+		+							0	
29 DI	20 Big LIn: Mud Tanks	Demonstrate the ability to Fill Mud Tanks. Check & Benair Leaks & Function Test All												
52		Associated Equipment.											0	
		Demonstrate the ability to install flow line & associated equipment.		1	1								0	
		Demonstrate the ability to install mud mix equipment.											0	
		Demonstrate the ability to install solids/gas control equipment.		1		1							0	
³⁰ DL	22 Rig Up: Drill Water Systems	Demonstrate the ability to Install Trip TanK & Associated Equipment & lines.			[								0	
		Demonstrate the ability to set Reserve Water Tanks, Rig Water Tanks, Check & Repair												
		Leaks.											0	
		<ul> <li>Demonstrate the ability to position choke manifold/gas seperator.</li> </ul>			Į								0	
31 DL	27 Rig Down: Critical Steps	<ul> <li>Demonstrate ability to ensure all equipment has been removed from location.</li> </ul>			ļ								0	
		Demonstrate ability to ensure BOP and associated equipment is nippled down and loaded												
		out.			ļ						ļ		0	
		<ul> <li>Demonstrate ability to lower and prepare mast for transport.</li> </ul>			<b>.</b>								0	
		Demonstrate ability to shut down power for ancillary equipment.											0	
		Explain ability to ensure correct order for shut down of ancillary equipment.			+								0	
32 DI	28 Big Down: Fall Protoction	Explain JSA / Work Plan knowledge for each childal step.											0	
DL	28 Kig Down. Pail Protection	Explain nin removal and accordated bazards											0	
		Explain procedures for working around the cellar/well head		+	1		+						0	
33 DI	29 Big Down: Inspection Process	Explain procedures for working around the centry were read.		1	-	1							0	
DE		<ul> <li>Explain pre-move inspection process for ancillary equipment.</li> </ul>		1	1	-					1		0	
34 DL	30 Rig Down: Transportation	<ul> <li>Demonstrate ability to ensure drill line is prepared for travel.</li> </ul>		1	1	1							0	
	5 · · · · · · · ·	<ul> <li>Demonstrate ability to separate and load out substructure.</li> </ul>		1	1								0	
		<ul> <li>Explain how to secure all lines, piping and physical objects to prevent hazards during</li> </ul>		1	1	1					1			
		transporting.											0	
³⁵ DL	31 Rig Down: Environmental	<ul> <li>Explain drilling fluid capture and transfer process.</li> </ul>											0	
		<ul> <li>Explain, if applicable, the process for oil-based mud (OBM) rig clean up and containment.</li> </ul>			1								0	

# Annex-11 : Competency Table: – Assistant Driller 4/18

Position:	Assistant Driller		Competency level required						Prof	iciency S	Scale		GAP	In	dividual [	evelopm	ient Plan
				Re	quired S	core			Ac	tual Sco	re			1 🔽		_	
No Cod	le No Functional competency	Description of competency	Awaren	e Applicat	i Career	Advance	Expert	Awarene	Applicati	Career	Advanced	Expert		1			
		,	SS	on	Proficien	d Level	Level	ss	on	Proficient	Level	Level		1			
36 DI	22 Vertical/Conventional Drilling: Pig Math Well	Demonstrate how to measure strap & caliner all tubulars		2		4	5	1	2	3	4	5			<u> </u>	F	
	Head and BOP Control Equipment	Demonstrate now to measure, strap, & camper an tubulars.											0	1			
		<ul> <li>Demonstrate how to check drilling fluids characteristics and measurement.</li> </ul>		1		1			1				0	1			
		<ul> <li>Demonstrate how to measure from Rotary Kelly Bushings to Well Head/Rotary Kelly</li> </ul>												1			
		Bushings to all Blowout Preventor Rams and Annular.							ļ				0				
		<ul> <li>Demonstrate how to perform math calculations on pressure &amp; volume.</li> </ul>											0	ιL	'	<u> </u>	
27		Explain the rig components and their limitations.		-									0	1 L		<u> </u>	_
37 DL	34 Vertical/Conventional Drilling: Drawworks & Associated Equipment	<ul> <li>Demonstrate how to operate drawworks and associated components.</li> </ul>											0				
		• Explain the function of drawworks and all associated components (crown saving devices,												i [			
		brake systems & coolant lines, guards, chains, sprockets, gear boxes, shut downs,												1			
		hoisting/lowering limits per rig design).		-	_			-					0	1 L		<u> </u>	
38 DL	35 Vertical/Conventional Drilling: Automated	<ul> <li>Demonstrate how to ensure that moving equipment does not interfere with other</li> </ul>											0	1			
	Pipe Handling	equipment/machinery - simulataneous Operations.			+								0				
39 DI	36 Vertical/Conventional Drilling: Execution Of	Demonstrate how to follow the client's daily drilling plans.		+											-+-		+
	Drilling And Well Operations	•											0	1			
	<b>.</b>	<ul> <li>Demonstrate how to maintain an accurate pipe tally in relation to the well design.</li> </ul>											0				
		<ul> <li>Demonstrate how to make trips.</li> </ul>											0				
		<ul> <li>Demonstrate how to complete the daily tour sheet.</li> </ul>											0	ıL			
40 DL	39 Vertical/Conventional Drilling: Pipe	<ul> <li>Demonstrate correct measuring points on all tubular, casings and tools.</li> </ul>											0	1			
	measurement, number and strapping of pipes	Evolution how to correctly read a strapping tape											0				
		Explain how to properly number stands in derrick when TIH or POOH.		+									0				
41 DL	40 Vertical/Conventional Drilling: Stuck Pipe	Demonstrate how to determine the drill string operating limits.															+
	Operation												0	1			
42 DL	41 Vertical/Conventional Drilling: Downhole	<ul> <li>Explain downhole problems and potential equipment failures.</li> </ul>												1			
	problems and equipment failure												0				
43 DL	42 Vertical/Conventional Drilling: Standpipe and Bleed Off Line	<ul> <li>Demonstrate how to ensure all valves are in the "full open" or "closed" position.</li> </ul>											0				
44 DL	44 Vertical/Conventional Drilling: Tripping	<ul> <li>Demonstrate how to correctly monitor and record mud return and fill volumes while</li> </ul>												1			
		tripping in/out to recognize warning signs for well control issues.											0			ļ	
		• Explain efficient tripping speeds in open hole and when bit/ stab go through BOPs.											0				
		Explain how to monitor and record mud return and fill volumes while tripping in/out to											0	1			
45 DI	47 Vertical/Conventional Drilling: Picking up	Demonstrate the ability to caliner and measure the BHA		+									0	1 H		———	
	drilling assembly	Bemonstrate the ability to caliber and measure the bink.											0	1		,	
		<ul> <li>Demonstrate the method for strapping and counting the drill pipe.</li> </ul>											0	1			
		<ul> <li>Explain the importance and how to caliper and measure the BHA.</li> </ul>											0				
		<ul> <li>Explain the method for strapping and counting the drill pipe.</li> </ul>											0	ıL			
46 DL	50 Vertical/Conventional Drilling: Underbalanced	<ul> <li>Demostrate how to maintain equivalent circulating density (ECD) during underbalanced</li> </ul>												1			
	Drilling	drilling.											0			·	
		Explain additional Instrumentation used during underbalanced drilling.     Explain bit volumes and flow characteristics		-									0	ιŀ			
		Explain the use of rotating control device (RCD).		+	+				+				0				
		<ul> <li>Explain the well control procedures and process during underbalanced drilling.</li> </ul>		1					†				0				
47 DL	51 Well Control: Riser/Diverter/ BOP (Run &	Demonstrate how to install new wellhead gaskets.	i i	1	1				1					i F			-
	Retrieve)	-											0	ιL			
		<ul> <li>Explain how to identify ring gaskets in relation to BOP flanges.</li> </ul>							L				0				
		<ul> <li>Explain how to install new wellhead gaskets.</li> </ul>							ļ				0	ı		·	
		<ul> <li>Explain the different phases of nippling up BOP and diverter based on hole section.</li> </ul>				-							0	ιL			

# Annex-11 : Competency Table: – Assistant Driller 5/18

Position:	Assistant Driller		Co	ompeter	ncy leve	l require	ed		Pro	ficiency	Scale		GAP	Indiv	idual D	evelop	ment Pl	an
				Req	uired So	core			A	ctual Sco	ore						_	
No Cod	e No Functional competency	Description of competency	Awarene	Applicati	Career	Advance	Expert	Awarene	Applicati	Career	Advanced	Expert						
			SS	on	Proficien	d Level	Level	SS	on	Proficient	Level	Level						
48 DI	E2 Wall Control: Divorting	Evalain how to pump aither kill mud as water	1	2	l t	4	5	1	2	3 1	<b>4</b>	5	0				<u> </u>	_
40 DL	52 Weil Control: Diverting	Explain how to pump either kill mud or water.     Explain the importance of operating the diverter.											0		++			_
49 DI	53 Well Control: Management Well Control	Demonstrate function test of the BOP													++			-
	Systems												0					
		<ul> <li>Explain BOP components, their functions and their limitations.</li> </ul>							1	1			0					
		• Explain the normal line up of BOP valves, Hydraulic chokes, Choke manifold and degasser									1							
		in accordance to the well program.											0					
50 DL	54 Well Control: Well Integrity And Well Control	<ul> <li>Demonstrate how to take SPR's, complete kill sheet and take accurate and correct SIDPP</li> </ul>																
		and SICP gauge readings.							ļ				0					
		<ul> <li>Explain how to take SPR's, complete kill sheet and take accurate and correct SIDPP and</li> </ul>																
		SICP gauge readings.							+				0					
		<ul> <li>Explain the different methods for shutting the well and the killing procedures.</li> <li>Evaluation have to recognize influe and shut in well.</li> </ul>											0		++			
51 DI	55 Unconventional Drilling: Air Drilling	Explain now to recognize innux and shut in well.     Evalain rig up of low prossure air system into high prossure mud system											0	-	+	-		_
DL DL	55 Onconventional Drining. All Drining	Explain the function of blogie line and how to secure											0		++			
		Explain the importance of an igniter at the end of a blooie line.											0					
		<ul> <li>Explain the pressure differential between input air and return air.</li> </ul>							1				0		++			
		<ul> <li>Explain the use of rotating control device (RCD).</li> </ul>											0					
52 DL	57 Directional Drilling: Mechanical Survey Tools	<ul> <li>Explain the application for Teledrift type drift indicators.</li> </ul>							1				0					
		<ul> <li>Explain the application for Totco type drift indicators.</li> </ul>											0					
53 DL	60 Directional Drilling: Wellbore Surveying and	<ul> <li>Demonstrate how to run a survey.</li> </ul>																
	Record Keeping					ļ							0					
54 DL	66 Hoisting/Rig Floor: Derrick Climbing Systems	<ul> <li>Demonstrate how to use equipment associated with personnel climbing systems (rig</li> </ul>																
		specific).							+				0					~~~~
55 DI		Explain how to inspect equipment associated with personnel climbing systems.											0		+			
55 DL	70 Hoisting/Rig Floor: Mannding Winches & Beits	Demonstrate correct nand signals associated with operating mannaing winch.     Demonstrate how to inspect manriding winch											0		+			
		Demonstrate how to inspect wear & fasten manriding helt							+				0		++			
56 DL	71 Hoisting/Rig Floor: Utility Winches	Demonstrate correct hand signals associated with operating utility winch.											0		+			
		<ul> <li>Demonstrate how to safely operate and maintain utility winch.</li> </ul>											0					
57 DL	72 Power Systems: Engine instrumentation	Explain the purpose of engine instrumentation.				1							0					
58 DL	73 Power Systems: Engine report and log book	<ul> <li>Demostrate how to record engine gauge readings and maintain logs.</li> </ul>											0					
		<ul> <li>Explain the purpose of record keeping.</li> </ul>											0					
59 DL	74 Power Systems: Engine fluids	<ul> <li>Demonstrate how to check engines fluids levels and add as required.</li> </ul>								Ļ			0					
		<ul> <li>Explain types of engine fluids and level requirements.</li> </ul>							ļ				0		+			_
60 DL	75 Power Systems: Engine fuel system	<ul> <li>Demonstrate how to ensure pressure, filtation and line requirements will sustain engine</li> </ul>																
		operation.											0					
61 DI	76 Dower Systems: Engine cooling system	Explain pressures, incration, and line inspection.											0		+			_
DL	76 Power Systems. Engine cooling system	Explain now to check engine coolant level.							-				0		+			-
62 DI	77 Power Systems: Engine air intake systems	Demonstate how to change air filters.											0		+			-
		<ul> <li>Explain how to inspect air filters and intake differential pressures.</li> </ul>							1				0					
63 DL	78 Circulating Systems: Low Pressure Mud	<ul> <li>Demonstrate valve alignment to transfer mud and mix chemicals in each pit.</li> </ul>	11		ĺ	1			1	1	1							-
	System	- '											0					
		Explain the layout of the pits including valve locations.											0					
64 DL	79 Circulating Systems: High Pressure Mud	<ul> <li>Demonstrate how to change out expendables.</li> </ul>					7					1				Τ		
	System	• · · · · · ·			L		ļ		ļ	ļ		ļ	0					
		Demonstrate how to isolate the valves.		<u> </u>	<b> </b>								0					
		Demonstrate now to monitor mud pumps during operating.     Evaluin how to shared out overandables.					ļ						0		+			
		Explain now to unarge out expendables.     Explain the number and operation of mud number									+		0		++			
		Identify where valves are located.			l				+	1	+		0		++			
L				· · · · · · · · · · · · · · · · · · ·	,				5			2	-		-		1	

# Annex-11 : Competency Table: – Assistant Driller 6/18

Positio	n: /	Assi	stant Driller		Co	ompete	ncy leve	el requir	ed		Prof	iciency S	Scale		GAP	Inc	lividual Develop	pment Plan
					Required Score						Ac	tual Sco	re					
No C	ode	No	Functional competency	Description of competency	Awarene	Applicat	i Career	Advance	Expert	Awarene	Applicati	Career	Advanced	Expert				
			· · · · · · · · · · · · · · · · · · ·		ss	on	Proficier	d Level	Level	SS	on	Proficient	Level	Level				
65 D	NI.	80	Circulating Systems, Bulgation	Domenstrate how to perform maintenance of a pulsation domenous	1	2	t	4	5	1	2	3	4	5			<u> </u>	
05 0	/L	80	Damponor/Pladdor	Demonstrate now to perform maintenance of a pulsation dampener.											0			
			Dampener/Bladder	Evolution the operation and maintenance of a nulsation dampener		+									0			
				Explain the operation and maintenance of a pulsation dampener.											0			
66 D	)	81	Circulating Systems: Shale shakers	Demonstrate shale shaker maintenance											0	_	<del></del>	
		01	encoloring systems, shale shakers	Demonstrate how to adjust shaker screens		+							1		·····			
				Demonstrate how to change shaker screens		+	+		1						0			
				Explain how to adjust shaker screens		-	1		1						0	******		
				Explain how to change shaker screens.											0			
				Explain shale shaker maintenance.		+	1		1			+			0			
				• Explain the purpose of a shale shaker.		1	1						1		0			
67 D	)L	82	Circulating Systems: Trip Tanks	<ul> <li>Demonstrate how to line up trip tank valves for filling or monitoring the hole.</li> </ul>			1								0			
			<i>.</i> .	Explain how to line up trip tank valves for filling or monitoring the hole.		1									0			
				Explain the purpose of the trip tank.		1									0			
68 D	)L	83	Circulating Systems: Mud Saver Bucket	Demonstrate how to perform maintenance on the mud saver bucket.											0			
				Demonstrate how to use the mud saver bucket.		1	1								0			
				<ul> <li>Explain the purpose of a mud saver bucket.</li> </ul>											0			
				<ul> <li>Explain when to use the mud saver bucket.</li> </ul>		-	1								0			
69 D	)L	84	Rotating System: Master Bushings	<ul> <li>Demonstrate how to perform maintenance of the master bushings.</li> </ul>											0			
				<ul> <li>Explain how to perform maintenance of the master bushings.</li> </ul>											0			
				<ul> <li>Explain the purpose of the master bushings.</li> </ul>											0			
70 D	L	85	Rotating System: Rotary Table	<ul> <li>Demonstrate the maintenance procedures for the rotary table.</li> </ul>											0			
				<ul> <li>Demonstrate the procedure for locking and working around.</li> </ul>											0			
				<ul> <li>Explain the maintenance procedures for the rotary table.</li> </ul>											0			
				<ul> <li>Explain the procedure for locking and working around.</li> </ul>											0			
				• Explain the purpose of the rotary table.											0			
71 D	)L	86	Well Control Equipment: BOP Handling	<ul> <li>Demonstrate proper sling application and attachment methods between lifting device and</li> </ul>														
			Systems	BOP equipment.									ļ		0			
				<ul> <li>Explain JSA / Work Plan knowledge for each critical step.</li> </ul>											0			
				Explain proper application and use of BOP handling systems.											0			
72 D	)L	87	Well Control Equipment: BOP Control System	<ul> <li>Demonstrate how to connect the HCR valve, manual valve, coflex hose, for BOP and choke</li> </ul>														
			And Accumulator	manifold.			-								0			
				Demonstrate how to connect the kill line and check valve as designed.		-									0			
				Demonstrate now to function test all BOP elements.											0			
				Demonstrate now to install the Driller's and remote BOP control panels and function test											0			
				Demonstrate that all values and gauges are in good working condition and clearly marked		+												
				as to their function											0			
				Demonstrate that resevoir is filled to proper fluid level with proper fluid		+	+						t					
				Explain how to connect the HCR valve, manual valve, coflex hose, for BOP and choke		1	1	-										
				manifold.											0			
				Explain how to function test all BOP elements.			1								0			
				• Explain how to install the Driller's and remote BOP control panels and function test same.		1	1		1						0			
				Explain the designed arrangement foor kill line and check valve.		1	1	1				1			0			
				• Explain the importance of the condition of valves and gauges and their identification.		T	1	1				1	1		0			
				<ul> <li>Explain the requirements for BOPE hydraulic lines.</li> </ul>		1	1					Γ	[		0			

# Annex-11 : Competency Table: – Assistant Driller 7/18

Position:	Assistant Driller		Competency level required						Prof	iciency S	cale		GAP	Individual Development Plan
				Rec	quired S	Score			Ac	tual Sco	re			
No Code	e No Functional competency	Description of competency	Awarene	Applicat	i Career	Advance	Expert	Awarene	Applicati	Career	Advanced	Expert		
			SS 1	on	Proficie	n d Level	Level	SS 1	on	Proficient	Level	Level		
73 DL	88 Well Control Equipment: BOP Preventers & Fail Safe Valves	Demonstrate how to install bolt completely into the nut.				4	3		2	3	4		0	
		Demonstrate how to select and install the appropriate ring gaskets in all connections.			+								0	
		<ul> <li>Demonstrate proper torque sequence to insure flange gap is even on all sides.</li> </ul>			-								0	
		<ul> <li>Demonstrate that all BOP components have been inspected and certified in accordance</li> </ul>											~~~~~	
		with OEM specifications.											0	
		<ul> <li>Explain how to guide upper BOP sections onto lower sections.</li> </ul>											0	
		<ul> <li>Explain how to open the BOP doors and change pipe rams and blind rams.</li> </ul>											0	
		<ul> <li>Explain OEM specifications and certification for BOP components.</li> </ul>											0	
		<ul> <li>Explain the importance of always using new and appropriate ring gaskets in all</li> </ul>												
		connections.											0	
		<ul> <li>Explain the importance of having the proper flange gap on all sides.</li> </ul>											0	
		Explain the importance of why all bolts need to be engaged comletely into the nut. Explain the proper accombly (stack out) of all BOD components to be used per drilling.			-								0	
		<ul> <li>Explain the proper assembly (stack-out) of all BOP components to be used per drining program</li> </ul>											0	
74 DI	89 Well Control Equipment: BOP Testing	Demonstrate how to connect the test lines and secure from test unit to BOP.	1		1									
52	Fauipment												0	
		Demonstrate how to open the BOP doors and change rams.				-							0	
		<ul> <li>Demonstrate that hydraulic lines are of proper pressure rating.</li> </ul>			1								0	
		Demonstrate that the test unit is of adquate pressure rating to test the BOP.											0	
		<ul> <li>Explain how to connect the test lines and secure from test unit to BOP.</li> </ul>											0	
		<ul> <li>Explain how to open the BOP doors and change rams.</li> </ul>											0	
		<ul> <li>Explain test unit pressure requirements in relation to BOP testing.</li> </ul>		ļ									0	
75		<ul> <li>Explain the requirements for BOPE hydraulic lines.</li> </ul>											0	
75 DL	90 Well Control Equipment: Full Opening Safety Valve, Kelly cock valve, IBOP	<ul> <li>Explain each tool, their function, storage position and location of each.</li> </ul>											0	
		<ul> <li>Explain the importance all wrenches for each safety valve are kept orderly and are readily available.</li> </ul>											0	
		<ul> <li>Explain the importance of inspecting valve connections in accordance with drill string requirements.</li> </ul>											0	
76 DL	91 Well Control Equipment: Float Valve	<ul> <li>Demonstrate how to visually inspect float valves for damage.</li> </ul>			1								0	
	· · · · · · · · · · · · · ·	<ul> <li>Demonstrate the installation of float valve in drill string.</li> </ul>			1					11			0	
		<ul> <li>Explain how to visually inspect float valves for damage.</li> </ul>											0	
		<ul> <li>Explain the installation of float valve in drill string.</li> </ul>											0	
77 DL	93 Well Control Equipment: Wellhead Adaptor	Demonstrate sizing and pressure rating of spools for wellhead and BOP equipment meet												
	Spools and Risers	requirements of drilling program.		ļ									0	
		<ul> <li>Demonstrate that flow lines are routed and secured at a location and distance to allow for</li> </ul>												
		flaring and/or fluid containment.											0	
		<ul> <li>Explain now lines routing and anchoring for haring and/or huid containment.</li> <li>Evaluate string and processor rating of speels for wellback and POD againment for drilling.</li> </ul>											0	
		<ul> <li>Explain sizing and pressure rating of spools for weineau and bor equipment per unning program</li> </ul>											0	
78 DI	94 Well Control:Testing BOP: Pressure And	Demonstrate how to ensure tool joint space out within the BOP are adequate and a vent			1									
	Function Testing Of BOPs	open below the wellhead test plug is open.											0	
	č	Demonstrate that appropriate ring gaskets are used for each flange.											0	
		<ul> <li>Demonstrate the test sequence of valves and BOP's including identifying leaks and how to</li> </ul>												
		correct them.		ļ						ļ			0	
		Explain how to identify ring gaskets in relation to BOP flanges.		ļ					ļ	ļ			0	
		Explain the test sequence of valves and BOP's including identifying leaks and how to												
		correct them.								ļ			0	
		<ul> <li>Explain tool joint placement (space out) within the BOP and the purpose of venting below the test aluar</li> </ul>												
		the test plug.	1	1	1		1		1	L			U	

# Annex-11 : Competency Table: – Assistant Driller 8/18

Position:	Assistant Driller		Co	ompete	ncy level requir	ed		Prof	iciency Sca	e		GAP	Individual Development Plan
				Red	quired Score			Ac	tual Score				
No Cod	e No Functional competency	Description of competency	Awarene	Applicat	i Career Advance	Expert	Awarene	Applicati	Career Ad	anced Ex	(pert		
			SS	on	Proficien d Level	Level	ss	on	Proficient I	evel L	evel		
79 DI	95 Well Control Testing BOP: Pressure And	Demonstrate how to function the valves to their fully open and closed positions and align	1	2	t 4	5	1	2	3	4	5		
DE	Eunction Testing Of BOPs Choke Manifold	for drilling operations.										0	
		<ul> <li>Demonstrate how to lubricate valves with the high pressure grease.</li> </ul>		1		1		+				0	
		<ul> <li>Demonstrate how to test to rated pressures and durations and how to bleed off test</li> </ul>		1				1					
		pressure after test.										0	
		<ul> <li>Explain how to test to rated pressures and durations and how to bleed off test pressure</li> </ul>											
		after test.		ļ		ļ		ļ				0	
		<ul> <li>Explain how to function the valves to their fully open and closed positions and align for</li> </ul>										_	
		drilling operations.										0	
80 DI	96 Well Control:Testing BOD: Prossure And	Explain now to lubricate valves with the nigh pressure grease.						-					
UL DL	Function Testing Of BOPs Kill and Chokeline	for drilling operations											
	Valves											0	
		Demonstrate how to lubricate valves with the high pressure grease.										0	
		<ul> <li>Demonstrate how to test to rated pressures and durations and how to bleed off test</li> </ul>		1				1					
		pressure after test.										0	
		<ul> <li>Explain how to test to rated pressures and durations and how to bleed off test pressure</li> </ul>											
		after test.		ļ		4		ļ				0	
		<ul> <li>Explain how to function the valves to their fully open and closed positions and align for</li> </ul>											
		drilling operations.										0	
81 DI	07 Well Centrel/Testing BOD/ Prossure And	Explain now to lubricate valves with the night pressure grease.				<u> </u>							
DL	57 Well Control. Testing BOP. Pressure And Function Testing Of BOPs Pressure Test	for drilling operations											
	Standpipe manifold											0	
		<ul> <li>Demonstrate how to lubricate valves.</li> </ul>										0	
		<ul> <li>Demonstrate how to test to rated pressures and durations and how to bleed off test</li> </ul>											
		pressure after test.										0	
		<ul> <li>Explain how to test to rated pressures and durations and how to bleed off test pressure</li> </ul>											
		after test.										0	
		<ul> <li>Explain how to function the valves to their fully open and closed positions and align for</li> </ul>											
		drilling operations.										0	
82 DI	102 Diesel numps	Explain now to tublicate valves.											
DL	105 Diesei pumps	<ul> <li>Explain the the importance of rig fuel filtering system.</li> </ul>		+								0	
		<ul> <li>Explain the use and maintenance of diesel pumps.</li> </ul>		1								0	
83 DL	104 Closed loop mud equipment	<ul> <li>Explain when the different types of closed loop mud cleaning equipment are used.</li> </ul>										0	
84 DL	105 Centrifugal pumps	<ul> <li>Demonstrate how to prime and maintain a centrifugal pump.</li> </ul>										0	
		<ul> <li>Explain how to prime and maintain a centrifugal pump.</li> </ul>										0	
85 DL	106 Diaphram pumps	<ul> <li>Demonstrate how to prime and maintain a diaphram pump.</li> </ul>		ļ				ļ				0	
		<ul> <li>Explain how to prime and maintain a diaphram pump.</li> </ul>										0	
86 DL	107 Valve types	<ul> <li>Demonstrate how to operate low pressure and high pressure valves.</li> </ul>										0	
		<ul> <li>Explain the different types of valves used in mud systems and where each type is</li> </ul>											
87 DI	109 Potory quivel	applicable.				<u> </u>			$\vdash$			0	
88 DI	112 Tubulars: Tubular care and maintenance	<ul> <li>Explain what a rotary swiver is and when it is used.</li> <li>Demonstrate how to clean and inspect connections during drilling and tripping operations.</li> </ul>	H		+				$\vdash$			0	
J DL	The research rubbin care and maintenance	<ul> <li>Explain how the slips and rotary bushing relate to the care of tubulars</li> </ul>		†		+		t	<u>├</u>			0	
		<ul> <li>Explain how to break in new tool joints.</li> </ul>		1		1		1				0	
		<ul> <li>Explain how to clean and inspect connections during drilling and tripping operations.</li> </ul>		1				1				0	
		• Explain the different types of mechanical surface imperfections that should be monitored											
		or prevented that could lead to failures.		ļ		ļ		ļ	Ļ			0	
		<ul> <li>Explain the importance of cleaning and inspection of tubular connections.</li> </ul>		ļ		ļ		ļ	ļļ			0	
		<ul> <li>Explain the procedures for storing and transporting tubulars.</li> </ul>				1		1				0	

# Annex-11 : Competency Table: – Assistant Driller 9/18

Position: Assistant Driller						Competency level required					Proficiency Scale					Develo	pmen	t Plan
			Required Score					Actual Score								_	_	
No Code	No Functional competency	Description of competency	Awarene	Applicati	Career	Advance	Expert	Awaren	Applicati	Career	Advanced	Expert						
	· · · · · · · · · · · · · · · · · · ·		SS	on	Proficien	d Level	Level	SS	on	Proficient	Level	Level						
89 DI	116 Completions: Completions string	Domonstrate how to opsure tubing banger lands appropriately on wellhood	1	2	t	4	5	1	2	3	4	5	0		<del></del>	<b>—</b>	<u> </u>	<u> </u>
UL .	110 Completions. Completions string	Demonstrate the correct running order of completion tubulars and correct space-out with		+						+							h	h
		seal assembly											0		1	1	į	
		Explain the correct running order of completion tubulars and correct space-out with seal													+			
		assembly.											0		1			
		<ul> <li>Explain the differences between handling tubing vs. drill pipe.</li> </ul>		1	1				-	1			0				[]	
90 DL	119 Forklift Operations	Demonstrate how to operate forklift.						-					0		+			
		<ul> <li>Demonstrate the ability to perform rigging and determine lifting capacities for forklift.</li> </ul>		1	1								0				[	[
		<ul> <li>Demonstrate the inspection and general maintenance procedure for a forklift.</li> </ul>											0					
		<ul> <li>Explain how to operate forklift.</li> </ul>											0		1			1
		<ul> <li>Explain rigging and lift capacities for forklift.</li> </ul>											0					
		<ul> <li>Explain the inspection and general maintenance of forklift.</li> </ul>											0				<u> </u>	
⁹¹ DL	120 Cementing	<ul> <li>Rig-up cementing lines and line up valves/ transfer mud to cementing unit.</li> </ul>											0					
92 DL	123 Other Operations: Conductor and Casings	<ul> <li>Demonstrate how to identify cross-threaded pipe.</li> </ul>			<u> </u>				1	ļ	ļ		0					ļ
		<ul> <li>Demonstrate how to stab casing.</li> </ul>		ļ	Ļ	ļ				Ļ			0			ļ	ļ	Ļ
		<ul> <li>Demonstrate visual inspection of casing threads for damage and cleanliness.</li> </ul>								ļ	ļ		0				ļ	
		<ul> <li>Explain how to identify cross-threaded pipe.</li> </ul>											0			ļ	ļ	
		<ul> <li>Explain how to stab casing.</li> </ul>		Ļ	Ļ	ļ				ļ			0			ļ	ليتستبل	
		<ul> <li>Explain visual inspection of casing threads for damage and cleanliness.</li> </ul>											0		<u> </u>	—		<u> </u>
93 DL	124 Other Operations: Casing Stabbing Board	<ul> <li>Demonstrate how to rig up and postition stabbing board.</li> </ul>			ļ								0				ļ	+
04 51		Explain how to rig up and postition stabbing board.		-					-				0		+'	⊢	$\vdash$	
94 DL	126 Other Operations: Mud Characteristics	<ul> <li>Demonstrate now to maintain correct mud properties mixing chemicals to mud as</li> </ul>													1		į	
		Instructed by mud engineer.											0				į	<u> </u>
		Demonstrate how to manage aerated or if it is gas-cut mud.											0		-+'			
		Demonstrate how to monitor solids control equipment.     Demonstrate how to record mud weight viscosity, and volumes			+								0				}	
		Demonstrate the mixing of chemicals required for the operation											0		+			
		Explain how to identify if mud is aerated or if it is gas-cut		+	<u> </u>				+				0			1	{	
		Explain how to record mud weight, viscosity, and volumes.		1					+	1			0					
		<ul> <li>Explain how to utilize the different solids control equipment for mud filtration.</li> </ul>											0		-			
		<ul> <li>Explain the basic chemicals needed for the operation.</li> </ul>		1	1								0					[
		<ul> <li>Explain the characteristics of drilling fluids &amp; their purpose.</li> </ul>								1			0		1			
		<ul> <li>Explain the importance of communicating mud properties and all fluid changes to rig</li> </ul>		1	1		~~~~~			1	1		******					
		personnel.											0					
95 DL	127 Other Operations: Mud Transfer	<ul> <li>Demonstrate how to line up valves, hoses and hard piping for the mud system transfers.</li> </ul>											0					
		<ul> <li>Demonstrate how to notify personnel of transfers, monitor mud volume sensors and re-</li> </ul>													1			1
		set once completed.		ļ						L			0		_		Ļ	1
		<ul> <li>Explain the importance of communicating fluid transfers and resetting PVT system.</li> </ul>									ļ		0			<u> </u>		
		<ul> <li>Explain the process for mud system transfers.</li> </ul>	μ										0	<u> </u>	+'	$ \longrightarrow $	⊢	
96 DL	128 Other Operations: Drill Water System	<ul> <li>Demonstate how to maintain adequate drill water.</li> </ul>			ļ					ļ			0			ļļ	ļ	
		<ul> <li>Explain the importance of maintaining adequate water volume for drilling operations.</li> </ul>	μ			<u> </u>			-	ļ			0			—╡	<u> </u>	
97 QHSE	01 Induction (Post Hire Corporate and Unit	<ul> <li>Demonstrate immediate response during coordinated drills (Including your assigned</li> </ul>								1					1		1	1
	Specific)	Muster Station(s) and location of your Lifeboat(s) (if applicable).											0		+'			<u> </u>
		<ul> <li>Explain assigned roles and responsibilities according to the Emergency Response Plans or Station Bill</li> </ul>													1			1
		Station bin		<u>+</u>	<u> </u>				+	+	+		······		·		}	h
		<ul> <li>Explain the general duties of the Unit/Crew specific positions.</li> <li>Explain your company's position in regard to compliance with regulatory requirements.</li> </ul>							-				0		+'		┢──┤	
		(for applicable position)											0		1			1
		<ul> <li>Explain your Company's specific Short Service Employee program (if applicable)</li> </ul>		+	1	<u> </u>			+	+	+		0			$ \longrightarrow $		h
		<ul> <li>Identify and explain the various components of the Rig or Unit.</li> </ul>		1					1				0		+		$ \rightarrow$	<u> </u>
		Provide evidence of completion of the Corporate and Unit Specific Induction/Orientation		1	1				1	1			·····					[
		course.			1					1			0		1			1
·								-						<u> </u>				<u> </u>
# Annex-11 : Competency Table: – Assistant Driller 10/18

Pos	ition:	Assis	stant Driller		C	ompe	etency leve	el requir	ed		Pro	ficiency S	Scale		GAP	Inc	lividual	Devel	opmei	nt Plan
						F	Required S	core			Α	ctual Sco	re			i 🔽				
No	Cod	e No	Functional competency	Description of competency	Awarene	Appli	icati Career	Advance	Expert	Awarene	Applicati	Career	Advanced	Expert		1				
					SS 1	01	n Proficier	n d Level	Level	SS 1	on	Proficient	Level	Level		1				
98	OHS	04	Quality, Health, Safety, Environment and	Describe your role and responsibilities in order to comply with company's OHSES policies.		2	. <u> </u>	4	2		2	3	4	<u> </u>		. —		T	<u> </u>	<u> </u>
			Security (QHSES) Policy												0					
				Explain good housekeeping practices and personal hygiene practices in accordance with		1														
				company policies.											0					
				<ul> <li>Explain the company's QHSES policies (as applicable).</li> </ul>		<u> </u>									0					
				<ul> <li>Explain the objectives and the importance of active participation in the various meetings</li> </ul>																
				held onsite/onboard (Induction meeting, Pre-shift meeting, Weekly safety meeting, Risk																
				Assessment/Pre-job meeting).		ļ									0					
				<ul> <li>Identify where you would find the company QHSES Policies.</li> </ul>	<u> </u>	Į		_							0		<u> </u>		<u> </u>	_
99	QHS	= 05	HSE Local Regulations and Relevant	Explain the local HSE regulations (Standards, laws and regulations that apply to the local HSE regulations (Standards, laws and regulations that apply to																
100	0.00	- 00	Ouglity Sefet: 8 Management Sustan	Occupational nearth and safety).		-		_							0	,	——		+	
100	QHS	- 06	Quality Safety & Management System	<ul> <li>Demonstrate the ability to havigate the company specific quality safety &amp; Management System</li> </ul>											0	1				
101	OHS	= 07	Station Bill/Emergency Response Plan and	Demonstrate the ability to perform the assigned duties as per the station bill/emergency.		-		_								,	+-	<u> </u>	<u> </u>	
	QIIS	_ 07 .	Emergency Drills	<ul> <li>Demonstrate the ability to perform the assigned dates as per the station billy energency response plan.</li> </ul>											0					
				<ul> <li>Demonstrate the correct donning, doffing and stowing of emergency PPE.</li> </ul>		1									0				-	
				<ul> <li>Describe all the emergency alarm sounds as well as the respective actions to take (H2S,</li> </ul>		1											1			
				Well Control, Fire Alarm, Abandon Alarm, Gas Alarm, Man overboard Alarm, Loss of																
				Station Position etc).								<u>.</u>			0					
				<ul> <li>Describe and identify the location of your muster point(s).</li> </ul>		ļ									0				_	
				<ul> <li>Describe the process to search and rescue personnel unaccounted for in an emergency</li> </ul>																
				situation.		ļ					ļ				0					
				<ul> <li>Identify the various site specific emergency equipment (Portable fire extinguishers, fixed</li> </ul>																
107	0.110	- 00		fire systems such as CO2, Life Boat, Life Raft, Rescue Boat, Escape Ladder etc).											0	,	—		+	
102	QHS	- 08	Emergency Preparedness and Response	<ul> <li>Demonstrate the assigned duties to be carried out during various emergencies/drills (for avamples Fire Drill, Abanden Drill, Cas Drill, Man Querbaard Drill, Man Deuro, Stability,</li> </ul>																
				Example. File Drill, Abandon Drill, Gas Drill, Man Overboard Drill, Man Down, Stability Drill, Well Control Drill, SOPER Drill, Helpdesk Eire Drill, Blackout Drill)											0					
				<ul> <li>Demonstrate the proper recording and completion of all emergency response training and</li> </ul>		+					+									
				drills											0					
				• Describe and identify the escape routes, markings, signage systems and lighting systems															1	_
				as applicable.											0					
				<ul> <li>Describe and identify the location of all emergency alarm actuators.</li> </ul>							1				0					
				<ul> <li>Describe how to react to well control situations and how often well control drills are</li> </ul>																
				conducted.		Į					ļ				0					
				<ul> <li>Describe the rig (unit) emergency response abandonment and notification procedures.</li> </ul>		ļ									0					
				<ul> <li>Explain the assigned duties to be carried out during various emergencies/drills (for</li> </ul>																
				example: Fire Drill, Abandon Drill, Gas Drill, Man Overboard Drill, Man Down, Stability																
				Drill, well control Drill, SUPEP Drill, Helpdesk Fire Drill, Blackout Drill).		-								<u> </u>	U	. —	_		+	
1				Explain the on spill energency plan(s) (shipboard on Pollution Energency Plan/spill     Prevention Control and Countermeasures Plan)								1			0					
1				<ul> <li>Explain the site specific emergency responses, exercises and training plans for all major</li> </ul>		+					+	<u> </u>						-	+	
1				hazardous situations											0					

#### Annex-11 : Competency Table: – Assistant Driller 11/18

Position: Assistant Driller			Co	mpeter	ncy leve	l require	d		Prof	ficiency	Scale		GAP	Individual Develo	pment Plar
				Req	uired So	core			Ac	ctual Sco	re				
No Code No Functi	onal competency	Description of competency	<b>Awarene</b>	Applicati	Career	Advance	Expert	Awarene	Applicati	Career	Advanced	Expert			
	• •	· · · /	SS	on	Proficien	d Level	Level	SS	on	Proficient	Level	Level			
103 OHSE 09 Risk Assessment	s (RA)	Demonstrate the ability to verify that risk control measurements are implemented and			τ	4	5			3	4	5			
		demonstrate how to assess their effectiveness.											0		
		Describe and demonstrate how safety critical equipment is tested and maintained.								1	1		0		[
		<ul> <li>Describe how simultaneous operations (SIMOPS) are managed to ensure that risk control</li> </ul>								1					[
		procedures are in place during the execution of related activities.											0		
		<ul> <li>Describe the operational boundaries and performance standards of the safety critical</li> </ul>													
		equipment.											0		
		<ul> <li>Describe the potential hazards on site and provide examples of what could trigger them</li> </ul>													
		and what could be their associated consequences.									ļ		0		
		<ul> <li>Describe the process by which potential or unforeseen risks are communicated to</li> </ul>													
		management and affected employees.									ļ		0		
		<ul> <li>Describe the process to systematically identify, evaluate, select and implement risk</li> </ul>													
		reducing controls									ł		0		I
		<ul> <li>Describe the roles and responsibilities of personnel participating in the risk assessment</li> </ul>											0		
		Process.											0		
		<ul> <li>Evaluation adverse environmental conditions by which the unit should not operate and the</li> </ul>								1			0		<b> </b>
		<ul> <li>Explain adverse environmental conditions by which the drift should not operate and the alerting systems available on site</li> </ul>											0		
		<ul> <li>Explain and demonstrate how to stop and secure work or tasks in case of any unforeseen</li> </ul>								1					
		or unplanned changes or hazards, and how to further assess risks associated with these													
		changes or hazards.											0		
		• Explain how the interaction of major hazards within your unit has been considered during													
		normal or simultaneous operations.											0		
		<ul> <li>Explain how to apply the hazard recognition and risk assessment techniques and the</li> </ul>													
		ability to implement risk mitigation measurements and controls.											0		L
		<ul> <li>Explain the maintenance and control of risk assessment documents.</li> </ul>				ļ				ļ	ļ		0		L
		<ul> <li>Explain when/if operations can continue when risk associated with simultaneous</li> </ul>													
		operations, inadequate equipment or lack of personnel are present.											0		ļ
101		<ul> <li>Identify and describe the safety critical equipment on site.</li> </ul>				-				<u> </u>	<u> </u>		0		┝──┤───
¹⁰⁴ QHSE 10 Permit To Work (	(PTW)/ Energy	<ul> <li>Demonstrate control and execution of energy isolation.</li> </ul>													
Isolations/L.O.I.0	0.												0		
		<ul> <li>Describe a scenario where electrical/ mechanical isolations are required.</li> <li>Describe the objectives of energy isolation and why presentions are important.</li> </ul>											0		
		<ul> <li>Describe the objectives of energy isolation and why precautions are important.</li> <li>Describe what constitutes a critical lift and all the precautions that must be in place.</li> </ul>								+			0		<b> </b>
		Evolution bow electrical/mechanical isolation would be confirmed safe to work on											0		
		<ul> <li>Explain now electrical/mechanical isolation would be committed safe to work on.</li> <li>Explain the types of energy sources that could be released at the site and the precautions.</li> </ul>													
		that need to be in place.											0		
¹⁰⁵ QHSE 11 Behavioral Based	d Safety System (BBSS)	Demonstrate the corrective action/feedback process in the BBSS program for an observed													
~	,	unsafe action/behavior.											0		
		Demonstrate the process to record and track non conformities from BBSS Observations.											0		
		<ul> <li>Describe the difference between an unsafe action/behavior and an unsafe condition.</li> </ul>									1		0		
		<ul> <li>Describe the importance of reviewing past BBSS observations and behaviors at safety</li> </ul>													
		meetings.											0		
		<ul> <li>Describe your role in the BBSS.</li> </ul>									ļ		0		L
		<ul> <li>Explain the company's BBSS.</li> </ul>											0		

# Annex-11 : Competency Table: – Assistant Driller 12/18

Position: Assistant Driller		Co	ompeter	ncy leve	l require	ed		Prof	iciency S	Scale		GAP	Individual Development	it Plan
			Req	uired So	core			Ac	tual Sco	re				
No Code No Functional competency	Description of competency	Awarene	Applicati	Career	Advance	Expert	Awarene	Applicati	Career	Advanced	Expert			
. ,	· · · ·	ss	on	Proficien	d Level	Level	ss	on	Proficient	Level	Level			
106 OHSE 12 General Housekeeping/Orderliness	Demonstrate the ability to secure the current work area or operation before evacuating	1	2	t	4	5	1	2	3	4	5			1
Quise 12 General Housekeeping/Ordenniess	during an emergency or drill											0		
	Demonstrates ability to ensure that the work area is clean and orderly, prior to and upon							+						+
	completion of the work, task or repairs.											0		
	Demonstrates ability to maintain and inspect hand and power tools in operationally safe							1						
	condition, without any unauthorized modifications.											0		
	Explain the hazards associated with using defective or modified hand or power tools.											0		
	<ul> <li>Explain the importance of closing out hazardous work activities before evacuating the area</li> </ul>													
	for an emergency or drill.											0		
	<ul> <li>Explain the importance of good housekeeping practices in the work areas and living</li> </ul>													
	quarters.											0		+
	Explain why it is important to keep tools put away and the work place clean in case of an													
	emergency.											0		<u> </u>
	<ul> <li>Explain your role in the nousekeeping practices in the work areas and living quarters.</li> </ul>							+				0		+
	<ul> <li>Demonstrate cleaning and organizing the work area upon completion of the work, task, or ropping</li> </ul>											0		
	Explain procedures personnel should follow if they observe worksite and water pollutants							<u> </u>						+
	during lifting operations											0		
107 OHSE 13 Environmental Management Plan	Describe the company Environmental Management Plan (EMP).											0		
and in the second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second	<ul> <li>Describe the location specific sensitivities of the receiving environment.</li> </ul>											0		
	<ul> <li>Describe the process for handling or discharging cuttings.</li> </ul>											0		1
¹⁰⁸ QHSE 14 Ship Oil Pollution Emergency Plan (SOPEP)	Describe the spill kit contents and how to use them.											0		-
¹⁰⁹ QHSE 15 Spill Prevention Control and Countermeasures	Describe the rig specific SPCC plan procedures to follow in case of a spill.													
Plan (SPCC)												0		
	<ul> <li>Demonstrate the ability to locate the SPCC Plan.</li> </ul>											0		
	<ul> <li>Demonstrate the ability to locate the Spill kit.</li> </ul>											0		
	<ul> <li>Describe the SPCC inspection process for the location and equipment before spud in.</li> </ul>							ļ				0		
	<ul> <li>Describe the spill kit contents and how to use them.</li> </ul>							ļ	ļ			0		ļ
	Explain how the SPCC plan bridges to the operator's well site plan.		ļ									0		
	<ul> <li>Explain the process or requirements of training on the SPCC elements.</li> </ul>				ļ							0		
	Explain the reporting procedures in the event of a spill on or off the well site location.											0		
	<ul> <li>Explain the SPCC containment system including the layout, need and maintenance.</li> <li>Evaluate a system including the layout, need and maintenance.</li> </ul>											0		
110 OUSE 16 Works Secondaria	Explain your role in a SPCC drill or an actual split.							-				0		
110 QHSE 16 Waste Segregation	<ul> <li>Describe the waste materials (either colid or liquid) and identify/categorize as one of the</li> </ul>													
	following: common waste industrial waste, bazardous waste and recyclable materials											0		
	<ul> <li>Describe what materials should be placed into the waste containers and why they need to</li> </ul>							+			·····	······		<u>+</u>
	be segregated.											0		
	Explain the continuous improvement of waste handling on the unit/location.							+	<u> </u>			0		
	• Explain the waste containers provided for common waste, industrial waste, hazardous				1		*****************	1						1
	waste and recyclable materials.											0		
111 QHSE 17 Dropped Objects Prevention	Describe the hazards associated while work is being conducted overhead.											0		
	Describe the main hazard areas/zones where dropped objects may occur.											0		
	• Explain how potential dropped objects are identified and how they should be reported.							ļ				0		ļ
	<ul> <li>Explain how the restricted areas/zones are enforced.</li> </ul>											0		<u> </u>
	<ul> <li>Explain precautionary measures required to avoid causing dropped objects and to protect</li> </ul>													
	personnel from those potential hazards.			ļ				<u> </u>	ļ			0		<u></u>
	<ul> <li>Explain the importance of a daily/weekly/monthly/annual dropped objects prevention</li> </ul>													
	inspection program.							+	<u> </u>			0		+
	<ul> <li>Explain why access should be restricted to all known dropped object areas/zones.</li> </ul>			1		1		1	1		1	0		1

# Annex-11 : Competency Table: – Assistant Driller 13/18

No         Code         No         Description of competency         Actual score         Actual score <t< th=""></t<>
No         Code No         Functional competency         Awarene position         A
Status       Status       Status       Status       Status       Status       Status       Status       Status       Status       Status       Status       Status       Status       Status       Status       Status       Status       Status       Status       Status       Status       Status       Status       Status       Status       Status       Status       Status       Status       Status       Status       Status       Status       Status       Status       Status       Status       Status       Status       Status       Status       Status       Status       Status       Status       Status       Status       Status       Status       Status       Status       Status       Status       Status       Status       Status       Status       Status       Status       Status       Status       Status       Status       Status       Status       Status       Status       Status       Status       Status       Status       Status       Status       Status       Status       Status       Status       Status       Status       Status       Status       Status       Status       Status       Status       Status       Status       Status       Status       Status       Status
112       QHSE       13       Fail Protection       Demonstrate the ability to find the fail arrest or restraint gear/equipment's information tag.       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0 <t< th=""></t<>
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be demonstrate the grant of the full per such as the demonstration of and control constructions of the full per such as the demonstration of the full per such as the demonstrate transferming from one location to another while maintaining 100 percent tie of the working at the difference between full arest and fall restraint.     Describe the difference between full arest and fall restraint.     Describe the difference between full arest and fall restraint.     Describe the difference between full arest and fall restraint.     Describe the difference between full arest and restraint equipment.     Describe the general requirements of the fall protection.     Describe the proper use of laders faced and portable) or scribids.     Describe the proper use of laders faced and portable) or scribids.     Describe the proper use of laders faced and portable) or scribids.     Describe the proper use of laders faced and portable) or scribids.     Describe the proper use of laders faced and portable) or scribids.     Describe the proper use of laders faced and portable) or scribids.     Describe the proper use of laders faced and portable) or scribids.     Describe the proper use of laders faced and portable) or scribids.     Describe the proper use of laders faced and portable or scribids.     Describe the proper use of laders faced and portable or scribids.     Describe the proper use of laders faced and portable or scribids.     Describe the proper use of laders faced and portable or scribids.     Describe the proper use of laders faced and portable or scribids.     Describe the proper use of laders faced and portable or scribids.     Describe the proper use of laders faced and portable or scribids.     Describe the proper user of laders faced and portable or scribids.     Describe the proper user laders faced and portable or scribids.     Describe the proper user laders faced and portable or scribids.     Describe the proper user laders faced and portable or scribids.     Describe the proper user laders faced and p
builtet tage, in all articitiges.     builtet tages in all articities geni.     bescribe the difference between fail arrest and fail restraint.     bescribe the emergency equipment and procedures (rescue plan) when rescuing someone at heights.     bescribe the general requirements of the fail protection.     bescribe the management of defective fail arrest and restraint equipment.     bescribe the management of defective fail arrest and restraint equipment.     bescribe the management of defective fail arrest and restraint equipment.     bescribe the proper work procedures and compared to protection while working in a metric the solution to using fail protection while working in a metric theyes of fail protection and fail arrest age requipment and how it is used.     Explain the importance of maintaining the proper voerhead ancharge point.     bescribe the proper work procedures and compared to the sak shand.     beomostrate the ability to operate lifting equipment for the task at hand.     beomostrate the ability of propervoperate lifting equipment for the task at hand.     beomostrate the ability of propervoperate lifting equipment for the task at hand.     beomostrate the ability of propervoperate lifting equipment for the task at hand.     beomostrate the ability of propervoperate lifting equipment for the task at hand.     beomostrate the ability of propervoperate lifting equipment for the task at hand.     beomostrate the ability of propervoperate lifting equipment for the task at hand.     beomostrate the ability of propervoperate lifting equipment for the task at hand.     beomostrate the ability of propervoperate lifting equipment for the task at hand.     beomostrate the ability of propervoperate lifting equipment for the task at hand.     beomostrate the ability of propervoperate lifting equipment for the task at hand.     beomostrate the ability of propervoperate lifting equipment for the task at hand.     beomostrate the ability of propervoperate lifting equipment fore thask at hand.     beomo
113 QHSE 20 Safe Use Of Lifting Equipment     113 QHSE 20 Safe Use Of Lifting Equipment     113 QHSE 20 Safe Use Of Lifting Equipment     113 QHSE 20 Safe Use Of Lifting Equipment     113 QHSE 20 Safe Use Of Lifting Equipment     114 Operative and analysis and consumer statisticity of all arrest and statisticity of all arrest gray/equipment and how it is used.     115 Capital the importance of maintaining the proper overhead and orage point.     115 Capital the importance of maintaining the proper overhead and orage point.     115 Capital the importance of lifting equipment (the correct lifting equipment to the task at hand.     113 Option Denotative the all arrest and in the importance of all lifting equipment to the task at hand.     114 Denotative the all arrest and in the regions     115 Option the proper task add how in the use of the proper the add and signals used in lifting equipment to the task at hand.     113 Option the proper task add how in the use of the proper task add hand signals used in lifting equipment to the bask weak of the proper task add hand signals used in lifting equipment to the bask add on the proper task add hand signals used in lifting equipment to the bask add on the proper task add hand signals used in lifting equipment to the bask add on the proper task add hand signals used in lifting equipment to the bask add on the proper task add hand signals used in lifting equipment to the bask add on the proper task add hand signals used in lifting equipment to the bask add on the proper task add hand signals used in lifting equipment to the bask add hand signals used in lifting equipment to the bask add hand signals used in lifting equipment to the bask add hand signals used in lifting equipment to the bask add hand signals used in lifting equipment to the bask add hand signals used in lifting equipment to the bask add hand signals used in lifting equipment to the bask add hand signals used in lifting equipment to the bask at hand.     115 Opercent the lifting equipment tor the tas
Or will working at heights.     Obscribe the difference between fail arrest and fail restraint.     Describe the difference between fail arrest and fail restraint.     Describe the inference between fail arrest and fail restraint equipment.     Describe the infinitations and the common misus of fail arrest and restraint equipment.     Describe the infinitations and the common misus of fail arrest and restraint equipment.     Describe the infinitations and the common misus of fail arrest and restraint equipment.     Describe the infinitations and the steady insert equipment and procedures and communication using fail protection while working in an earlail fit platform (man-iff/work hasked).     Describe the proper work for code was and communication using fail protection while working in an earlail fit platform (man-iff/work hasked).     Describe the proper work for code was and communication using fail protection while working in an earlail fit platform (man-iff/work hasked).     Describe the proper work for code was and communication using fail protection and fail arrest systems and how ach of them work.     Explain the different types of fail protection and fail arrest systems and how ach of them work.     Explain the different types of fail protection and fail arrest systems and how ach of them work.     Demostrate the ability to proper yoe protein diffing equipment.     Demostrate the ability to proper yoe core and androge point.     Demostrate the ability to proper yoe protections.     Demostrate the ability to proper yoe core and and and grapter to the task at hand.     Demostrate the evalue communications and hand signals used in lifting equipment.     Describe the tring equipment and how appearings.     Demostrate the verbal communications and hand signals used in lifting equipment.     Describe the proper use of tag lifting equipment.     Demostrate the evalue communications and hand signals used in lifting equipment.     Demostrate the verbal communication and hand signals used in lifting equipme
Describe the emergency equipment and procedures (rescue plan) when rescuing someone at heights.     Describe the general requirements of the fail protection.     Describe the general requirements.     Describe the general requirements of the fail protection and fail arrest aquipment.     Describe the general requirement.     Describe the proper use of loaders (fixed and portable) or scriffolds.     Describe the types of fail protection and fail arrest gear/equipment and how task of them     work.     Describe the types of fail protection and fail arrest gear/equipment and how task of them     work.     Describe the types of fail protection and boy basement when attaching the rigging to a load.     Demonstrate the ability to proper use of tag insertions that must be in place prior to     making a ritch line, and how sequence/policy and precautions that must be in place prior to     making a ritch line.     Describe the event communication sum fail protection may be addered to be addered the ability to proper use of tag insertion of the task at hand.     Demonstrate the ability to proper use of tag insertions that use in place prior to     making a ritch line.     Describe the event communications and hand signal used in lifting equipment.     Demonstrate the ability to proper use of tag insertions that must be in place prior to     making a ritch line.     Describe the event communications and hand signal used in lifting equipment.     Demonstrate the event communications and hand signal used in lifting equipment.     Describe the two rescale the correct lifting equipment to     Describe the two rescale the correct lifting equipment.     Describe the two rescale the correct lifting equipment to     Describe the ability to proper use of tag insertions that must be in place prior to     making a ritch lifting equipment.
bescribe the general requirements of the fail protection.     bescribe the general requirements of the fail protection.     Describe the general requirements of the fail protection.     Describe the inimitations and largest equipment.     Describe the morper matching the common misuse of fail arrest equipment.     Describe the morper matching spectron (including documentation) and storage of fail arrest equipment.     Describe the proper matching spectron (including documentation) and storage of fail arrest equipment.     Describe the proper use of ladders (fixed and portable) or scaffolds.     Describe the proper use of ladders (fixed and portable) or scaffolds.     Describe the types of fail protection and fail arrest graphment and how it is used.     Explain the different types of fail protection and fail arrest systems and how each of them work.     Explain the different types of fail protection and fail arrest systems and how each of them work.     Explain the different types of fail protection and fail arrest systems and how each of them work.     Explain the different types of fail protection and fail arrest systems and how each of them work.     Demonstrate proper use of tadders (thing equipment.     Demonstrate the ability to proper user thing equipment for the task at hand.     Demonstrate the ability to proper user thing equipment for the task at hand.     Demonstrate the work sequence/policy and precedutions.     Describe the work sequence/policy and precedutions and hand signals used in lifting operators.     Describe the matching the ingging to a load.     Demonstrate the weak formunication such and how the inpole proper user failing operators.     Describe the hand to come to loads including proper points.     Demonstrate the weak formunication and hand protegrape proper use of tag indications.     Describe the hand to come to loads including proper point to making activate the weak formunication and hand protegrape proper use of tag indications.     Demonstrate the weak communication and ha
a in legits.       Describe the general requirements of the fall protection.       Describe the limitations and the common issue of fall arrest and restraint equipment.       Describe the management of defective fall arrest equipment.       Describe the management of defective fall arrest equipment.       Describe the proper maintenance, cleaning, inspection (including documentation) and storage of fall arrest equipment.       Describe the proper were of ladders (fixed and portable) or scaffolds.       Describe the proper work procedures and communication using fall protection while working in an earal lift platform (man-lift/work basek).       Describe the proper work procedures and communication using fall protection and fall arrest gear/equipment.       Describe the proper work procedures and communication using fall protection and fall arrest gear/equipment.       Describe the proper work procedures and communication using fall protection and fall arrest gear/equipment.       Describe the proper work procedures and communication using fall protection and fall arrest gear/equipment.       Describe the proper work procedures and communication using fall protection and fall arrest gear/equipment.       Describe the proper work procedures and communication using fall protection and fall arrest gear/equipment.       Describe the proper work procedures and communication using fall protection and fall arrest gear/equipment.       Describe the proper work procedures and communication using fall protection and fall arrest gear/equipment.       Describe the proper work procedures and communication using fall protection and fall arrest gear/equipment.       Describe the proper work procedures and communication using fall protection and fall arrest gear/equipment.       Describe the proper work properly operatelifting equipment.<
<ul> <li>Describe the ginetral requirements of the air protection.</li> <li>Describe the initiations and the common missue of fail arrest and restraint equipment.</li> <li>Describe the proper waiter equipment.</li> <li>Describe the proper waiter equipment.</li> <li>Describe the proper waiter equipment.</li> <li>Describe the proper waiter equipment.</li> <li>Describe the proper waiter equipment.</li> <li>Describe the proper waiter equipment.</li> <li>Describe the proper waiter equipment.</li> <li>Describe the proper waiter equipment.</li> <li>Describe the proper waiter equipment.</li> <li>Describe the proper waiter equipment.</li> <li>Describe the proper waiter equipment.</li> <li>Describe the proper waiter equipment and how its used.</li> <li>Explain the different types of fail protection and fail arrest systems and how each of them work.</li> <li>Explain the importance of maintaining the proper overhead anchorage point.</li> <li>Explain the importance of proper use of tag lines tacking the rigging to a load.</li> <li>Demonstrate the point to proper over over of thing equipment.</li> <li>Demonstrate the ability to spect thing equipment.</li> <li>Demonstrate the ability to spect the correct lifting equipment.</li> <li>Demonstrate the ability to proper over for and hand signals used in lifting operations.</li> <li>Describe the signal of the ingertions of all arrest systems and how as and hand signals used in lifting operations.</li> <li>Describe the ability to spect on quipment.</li> <li>Describe the ability to spect on quipment for the task at hand.</li> <li>Describe the ability to spect on quipment.</li> <li>Describe the hilting equipment.</li> <li>Describe the maintaing the proper over and hand signals used in lifting operations.</li> <li>Describe the maintain and the operations.</li> <li>Describe the mai</li></ul>
<ul> <li>Describe the management of defective fail arrest quipment.</li> <li>Describe the management of defective fail arrest quipment.</li> <li>Describe the management of defective fail arrest quipment.</li> <li>Describe the proper maintenance, chanking, inspection (including documentation) and storage of fail arrest quipment.</li> <li>Describe the proper use of ladders (fixed and portable) or scaffolds.</li> <li>Describe the proper work procedures and communication using fail protection while working in a varial filt patform (man-lift/work basket).</li> <li>Describe the proper work procedures and communication using fail protection while working in a varial filt patform (man-lift/work basket).</li> <li>Describe the proper work procedures and communication using fail protection while work.</li> <li>Explain the different types of fail protection and fail arrest gar/quipment and how it is used.</li> <li>Explain the insportace to operate lifting equipment.</li> <li>Demonstrate the ability to proper use of tades the correct lifting equipment.</li> <li>Demonstrate the ability to proper use of tage insertions and hand signals used in lifting operations.</li> <li>Demonstrate the ability to proper use of tage insertions and hand signals used in lifting operations.</li> <li>Describe the proper use of tage insertion of all lifting equipment.</li> <li>Demonstrate the ability to proper operhead anchorage point.</li> <li>Explain who is autorized to operate lifting equipment.</li> <li>Demonstrate the ability to proper operhead anchorage point.</li> <li>Demonstrate the ability to proper operations.</li> <li>Demonstrate the ability to proper operhead anchorage point.</li> <li>Demonstrate the ability to proper operhead anchorage point.</li> <li>Demonstrate the proper use of tage insertation the numerications and hand signals used in lifting operations.</li> <li>Describe the malatenes torage and insertion of all lifting equipment.</li> <li>Describe the malatenes torage and insection of all lifting equipment.</li> <li>Describe</li></ul>
<ul> <li>Describe the management of detective fail arrest equipment.</li> <li>Describe the management of detective fail arrest equipment.</li> <li>Describe the proper use of ladders (fixed and portable) or saffolds.</li> <li>Describe the proper work procedures and communication using fail protection while working in an areial lift platform (man-lift/work basket).</li> <li>Describe the proper use of ladders (fixed and portable) or saffolds.</li> <li>Describe the proper use of ladders (fixed and portable) or saffolds.</li> <li>Describe the proper use of ladders (fixed and portable) or saffolds.</li> <li>Describe the proper use of ladders (fixed and portable) or saffolds.</li> <li>Describe the yes of fail protection and fail arrest gar/equipment and how it is used.</li> <li>Explain the different types of fail protection and fail arrest systems and how each of them work.</li> <li>Explain the importance of maintaining the proper overhead anchorage point.</li> <li>It and the ability to properly operate lifting equipment.</li> <li>Demonstrate the ability to proper yoerate lifting equipment.</li> <li>Describe the proper use of tag lifting equipment.</li> <li>Describe the ability to subtorice to compare prositioning.</li> <li>Describe the basic work sequence/policy and precautions. that must be in place prior to making a critical lift.</li> <li>Describe the prior and inscribe to noraction.</li> <li>Describe the ability to subtorice.</li> <li>Describe the ability to available on location.</li> <li>Describe the ability to proper yoeration.</li> <li>Describe the ability to available on location.</li> <li>Describe the ability to proper yoeration.</li> <li>Describe the ability to available on location.</li> <li>Describe the ability to available on l</li></ul>
<ul> <li>Describe the proper maintenace, cleaning, inspection (including documentation) and storage of fall arrest equipment.</li> <li>Describe the proper use of ladders (fixed and portable) or scaffolds.</li> <li>Describe the proper work procedures and communication using fall protection while working in an areful lift platform (man-lift/work baset).</li> <li>Describe the types of fall protection and fall arrest gear/equipment and how it is used.</li> <li>Explain the different types of fall protection and fall arrest systems and how each of them work.</li> <li>Explain the different types of fall protection and fall arrest systems and how each of them work.</li> <li>Explain the importance of maintaining the proper overhead anchorage point.</li> <li>Demonstrate the proper hand and body placement when attaching the rigging to a load.</li> <li>Demonstrate the proper use of tag lines attached to loads including proper portstoining.</li> <li>Demonstrate the verbal communications and hand signals used in lifting operations.</li> <li>Describe the lifting equipment available notoxion.</li> <li>Describe the lifting equipment available notoxion.</li> <li>Describe the lifting equipment available notoxion.</li> </ul>
113 QHSE 20 Safe Use Of Lifting Equipment       Explain the different type sof fall protection and had signals used in lifting equipment.       0       0       0         0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0 <t< td=""></t<>
<ul> <li>Describe the proper work procedures and communication using fall protection while working in an aerial lift platform (man-lift/work basket).</li> <li>Describe the proper work procedures and communication using fall protection while working in an aerial lift platform (man-lift/work basket).</li> <li>Describe the types of fall protection and fall arrest gear/equipment and how it is used.</li> <li>Explain the different types of fall protection and fall arrest gear/equipment and how each of them work.</li> <li>Explain the different types of fall protection and fall arrest gear/equipment.</li> <li>Explain the importance of maintaining the proper overhead anchorage point.</li> <li>Explain the iso authorized to operate lifting equipment.</li> <li>Demonstrate the ability to select the correct lifting equipment.</li> <li>Demonstrate the proper use of tag lines attached to loads including proper positioning.</li> <li>Demonstrate the proper use of tag lines attached to loads including proper positioning.</li> <li>Demonstrate the vork sequence/policy and precautions that must be in place prior to making a critical lift.</li> <li>Describe the maintengenet available on location.</li> <li>Describe the maintenge and insortion of all lifting equipment.</li> <li>Describe the maintenge and insortion of all lifting equipment.</li> <li>Describe the maintenge and insortion of all lifting equipment.</li> <li>Describe the maintenge and insortion of all lifting equipment.</li> <li>Describe the maintenge and insortion of all lifting equipment.</li> <li>Describe the maintenge and insortion of all lifting equipment.</li> <li>Describe the maintenge and insortion of all lifting equipment.</li> <li>Describe the maintenge and insortion of all lifting equipment.</li> <li>Describe the maintenge and insortion of all lifting equipment.</li> <li>Describe the maintenge and insortion of all lifting equipment.</li> <li>Describe the maintenge and insortion of all lifting equipment.</li> <li>Describe the maintenge and insortion of all lifting</li></ul>
<ul> <li>Describe the proper work procedures and communication using fall protection while working in an aerial lift platform (man-lift/work basket).</li> <li>Describe the types of fall protection and fall arrest gear/equipment and how it is used.</li> <li>Explain the different types of fall protection and fall arrest gear/equipment and how it is used.</li> <li>Explain the different types of fall protection and fall arrest gear/equipment and how it is used.</li> <li>Explain the different types of fall protection and fall arrest gear/equipment.</li> <li>Explain the importance of maintaining the proper overhead anchorage point.</li> <li>Explain the importance of maintaining the proper overhead anchorage point.</li> <li>Explain the importance of maintaining the rigging to a load.</li> <li>Demonstrate the ability to properly operate lifting equipment.</li> <li>Demonstrate the ability to select the correct lifting equipment for the task at hand.</li> <li>Demonstrate the proper use of tag lines attached to loads including proper positioning.</li> <li>Demonstrate the proper use of tag lines attached to loads including proper positioning.</li> <li>Describe the basic work sequence/policy and precautions that must be in place prior to making a critical lift.</li> <li>Describe the lifting equipment at must be in place prior to making a critical lift.</li> <li>Describe the lifting equipment at must be in place prior to making a critical lifting equipment at must be in place prior to making a critical lifting equipment to the task at must be in place prior to making a critical lifting equipment at must be in place prior to making a critical lifting equipment at must be in place prior to making a critical lifting equipment at must be in place prior to making a critical lifting equipment at must be in place prior to making a critical lifting equipment at must be in place prior to making a critical lifting equipment at must be in place prior to making a critical lifting equipment at must be in place prior to making a critical</li></ul>
113 QHSE 20 Safe Use Of Lifting Equipment       explain the different types of fall protection and fall arrest systems and how each of them work.       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0
<ul> <li>Describe the types of fall protection and fall arrest gear/equipment and how it is used.</li> <li>Explain the different types of fall protection and fall arrest systems and how each of them work.</li> <li>Explain the importance of maintaining the proper overhead anchorage point.</li> <li>Explain the is authorized to operate lifting equipment.</li> <li>Demonstrate the ability to properly operate lifting equipment.</li> <li>Demonstrate the ability to select the correct lifting equipment.</li> <li>Demonstrate the ability to select the correct lifting equipment.</li> <li>Demonstrate the ability to select the correct lifting equipment.</li> <li>Demonstrate the proper use of tag lines attached to loads including proper positioning.</li> <li>Describe the basic work sequence/policy and precations that must be in place prior to making a critical lift.</li> <li>Describe the basic more sequence for and not allable on location.</li> <li>Describe the maintenance of correct of all fing equipment available on location.</li> <li>Describe the maintenance storage and inspection of all lifting equipment available on location.</li> </ul>
Explain the different types of fall protection and fall arrest systems and how each of them work.
work.     Explain the inportance of maintaining the proper overhead anchorage point.     0     0       113 QHSE 20 Safe Use Of Lifting Equipment     Explain who is authorized to operate lifting equipment.     0     0       Demonstrate proper hand and body placement when attaching the rigging to a load.     0     0     0       Demonstrate the ability to properly operate lifting equipment.     0     0     0       Demonstrate the ability to properly operate lifting equipment.     0     0     0       Demonstrate the ability to select the correct lifting equipment for the task at hand.     0     0     0       Demonstrate the verbal communications and hand signals used in lifting oper prositioning.     0     0     0       Describe the basic work sequence/policy and precautions that must be in place prior to making a critical lift.     0     0     0       Describe the lifting equipment available on location.     0     0     0     0
Explain the importance of maintaining the proper overhead anchorage point.       0       0         113 QHSE 20 Safe Use Of Lifting Equipment       Explain the importance of maintaining the proper overhead anchorage point.       0       0       0         0       Explain who is authorized to operate lifting equipment.       Demonstrate proper hand and body placement when attaching the rigging to a load.       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0
113 QHSE 20 Safe Use Of Lifting Equipment       Explain who is authorized to operate lifting equipment.       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0
<ul> <li>Demonstrate proper hand and body placement when attaching the rigging to a load.</li> <li>Demonstrate the ability to properly operate lifting equipment.</li> <li>Demonstrate the ability to select the correct lifting equipment for the task at hand.</li> <li>Demonstrate the proper use of tag lines attached to loads including proper positioning.</li> <li>Demonstrate the verbal communications and hand signals used in lifting operations.</li> <li>Describe the basic work sequence/policy and precautions that must be in place prior to making a critical lift.</li> <li>Describe the lifting equipment available on location.</li> <li>Describe the lifting equipment of all lifting equipment</li> </ul>
Demonstrate the ability to properly operate lifting equipment.   Demonstrate the ability to select the correct lifting equipment for the task at hand.   Demonstrate the ability to select the correct lifting equipment for the task at hand.   Demonstrate the verbal communications and hand signals used in lifting operations.   Describe the basic work sequence/policy and precautions that must be in place prior to making a critical lift.   Describe the lifting equipment available on location.   Describe the lifting equipment of all lifting equipment
Demonstrate the ability to select the correct lifting equipment for the task at hand.   Demonstrate the opper use of tag lines attached to loads including proper positioning.   Demonstrate the verbal communications and hand signals used in lifting operations.   Describe the basic work sequence/policy and precautions that must be in place prior to making a critical lift.   Describe the lifting equipment available on location.   Describe the lifting equipment of all lifting equipment
<ul> <li>Demonstrate the proper use of tag lines attached to loads including proper positioning.</li> <li>Demonstrate the verbal communications and hand signals used in lifting operations.</li> <li>Describe the basic work sequence/policy and precautions that must be in place prior to making a critical lift.</li> <li>Describe the lifting equipment available on location.</li> <li>Describe the lifting equipment available on location.</li> <li>Describe the maintenance storage and inspection of all lifting envipment</li> </ul>
<ul> <li>Demonstrate the verbal communications and hand signals used in lifting operations.</li> <li>Describe the basic work sequence/policy and precautions that must be in place prior to making a critical lift.</li> <li>Describe the lifting equipment available on location.</li> <li>Describe the maintenance storage and inspection of all lifting environment</li> </ul>
Describe the basic work sequence/policy and precautions that must be in place prior to making a critical lift.     Describe the lifting equipment available on location.     Describe the maintenance storage and inspection of all lifting equipment
making a critical lift.  Describe the lifting equipment available on location.  Describe the lifting equipment available on location.  Describe the maintenance storage and inspection of all lifting equipment
Describe the lifting equipment available on location.      Describe the maintenance storage and inspection of all lifting equipment
Describe the maintenance storage and inspection of all lifting equipment
Describe the maintenance, storage and inspection of an inting equipment
(rigging/slings/shackles, etc.).
Describe the proper installation and rigging of all permanent and temporary lifting points
(anchor points, pad eyes, etc.).
Describe the proper use of tag lines attached to loads including proper positioning and
quantity.
Describe the verbal communications and hand signals used in lifting operations.
Explain proper hand and body placement when attaching the rigging to a load.
Explain the importance of a spotter during blind lifting operations.
Explain the minimum number of personnel and special precautions to be used during
critical lifting operations.
Explain the pre-lift plan and inspections process.
Explain the responsibilities of a rigger (banksman).
Explain what constitutes a critical lift.

#### Annex-11 : Competency Table: – Assistant Driller 14/18

Position: Assistant	t Driller		Co	mpete	ncy leve	l require	d		Prof	iciency	Scale		GAP	Indiv	idual Development Plan
				Rec	uired S	core			Ac	tual Sco	ore				
No Code No	Functional competency	Description of competency	Awarene	Applicati	Career	Advance	Expert	Awarene	Applicati	Career	Advanced	Expert			
	,, ,, ,, ,, ,, ,, ,		SS	on	Proficien	d Level	Level	SS	on	Proficient	Level	Level			
114 OHSE 21 Lifting	of Personnel	Demonstrate the ability to properly utilize personnel lifting equipment	1	2	t	4	5	1	2	3	4	5	0		
QH3E 21 Litting	of Personner	Demonstrate the ability to properly utilize personnel lifting equipment/device											0		
		Demonstrate the ability to select the proper personnel inting equipment/device.			+						1		0		
		Describe safety precautions personnel inting equipment.			+	+				+	+		0		+
		Explain conditions, authority, and hand signals personnel inting devices.	-								-		0		
		<ul> <li>Explain conditions, autionaly, and nand signals necessary to stop personner inting operations.</li> </ul>											0		
		<ul> <li>Explain the importance of using load balance, weight tolerances, and environmental</li> </ul>			1										
		conditions before and during personnel transfer.											0		
		<ul> <li>Explain the inspection of equipment necessary for lifting of personnel.</li> </ul>											0		
		<ul> <li>Explain the precautions and pre-lift requirements before personnel are transferred or</li> </ul>													
		lifted.											0		
¹¹⁵ QHSE 22 Crane	Safety	<ul> <li>Describe the maintenance, storage and inspection of all lifting equipment</li> </ul>													
		(rigging/slings/shackles, etc.).			1						<u> </u>		0		
¹¹⁶ QHSE 23 Use a	nd maintenance of utility winch	<ul> <li>Demonstrate rigging practices for safe lifting and movement of tubulars and irregular changed equipment (materials)</li> </ul>											0		
		Shaped equipment/materials.								<u> </u>			0		
		Demonstrate the energian of a utility winch operations.			+										
		Demonstrate the operation of a utility which.											0		
		Describe the operational and safety responsibilities of a winch operator.		h	+	+			<u> </u>		+				
		Describe the specific locations where utility winches are installed on the unit.     Evaluate practices for cofe lifting and movement of tubulars and irregular shaped			+										
		<ul> <li>Explain rigging practices for sale inting and movement of tubulars and irregular snaped assumed (metasial)</li> </ul>											0		
		Explain the capacity and limitations of utility winches													
		Explain the capacity and initiations of during whiches.     Explain the projuce increasion store required before exercising a utility winch											0		
		<ul> <li>Explain the pre-use inspection steps required before operating a utility which.</li> <li>Explain the required maintenance for a utility winch and accessories.</li> </ul>			+	+					+		0		
117 OHSE 25 Accide	ant/Incident Investigation	Explain the required maintenance for a durity which and accessories.     Explain the company's policies/procedures for reporting an incident resulting in personal													
		injury equipment damage a near miss or any notential hazard											0		
		Explain the importance of active participation in an incident investigation		†	1	1				1	1				
		Explain the importance of following up and closing corrective actions			1						1		0		
		<ul> <li>Explain the importance of following up and closing concerve actions.</li> <li>Explain what a corrective action is and why it is being implemented</li> </ul>		<u> </u>	+	+			<u> </u>		1		Ö		
		<ul> <li>Explain what a concerne action is and why it is being implemented.</li> <li>Explain why facts are important to an incident investigation</li> </ul>		<u> </u>	1					†	1		0		
118 OHSE 26 Chem	ical Handling & SDS (MSDS) (GHS)	Demonstrate selection and correct use of PPE when bandling chemicals in accordance			1	1					1				+ + + + + + - + + + + + + + + + + + + +
quise 20 chem		with the SDS.											0		
		Describe appropriate actions necessary in the event of exposure/contact with chemicals or		<u> </u>	1	1			İ	1	1				
		spill.											0		
		Describe the health and environmental risks associated with chemicals used at the work		1	1						1				
		site.											0		
		Describe the information contained in a SDS.		1	1	1				1	1		0		
		Describe the storage and segregation process for chemicals.			1						1		0		
		Explain the minimum requirements for labeling, documentation and packing of chemicals.							[	1	1		0		
		Explain what NORM is, where NORM occurs and explain the precautions to be taken to									1				
		prevent exposure.											0		
		<ul> <li>Explain where Safety Data Sheets (SDS) are located.</li> </ul>									1		0		
¹¹⁹ QHSE 27 Equip	ment Safety	Describe and give examples of various equipment guards and their purpose.		ļ	ļ	ļ			ļ	ļ	ļ	ļ	0		
		Explain the hazards and precautions of working around moving (dynamic) equipment.		L	1				l	ļ	1		0		
		Explain the hazards and precautions of working around rotating equipment.											0		
		<ul> <li>Explain the hazards and precautions to take when working with or near low or high</li> </ul>												1	
		pressurized equipment.			1	<u> </u>			L		1		0		
		<ul> <li>Explain the importance of ensuring that proper fittings (hammer unions/quick</li> </ul>									1			1	
		connect/hydraulic fittings) are being used in piping, hoses and equipment.			1						1		0		

# Annex-11 : Competency Table: – Assistant Driller 15/18

Position	1: A	Assistant Driller		Co	ompet	tency lev	el requir	ed		Pro	ficiency	Scale		GAP	Ir	ndividu	al Dev	velopm	ient Plan
					R	equired S	Score			Α	ctual Sco	re			i 🔽				_
No Co	ode	No Functional competency	Description of competency	Awarene	Applic	cati Career	Advance	Expert	Awarene	Applicati	Career	Advanced	Expert		i 🔽				
				SS 1	on	Proficie	n d Level	Level	SS 1	on	Proficient	Level	Level		i 🔽				
¹²⁰ QH	HSE	29 Personal Protective Equipment (PPE)	Demonstrate the proper selection and usage (donning/doffing) of PPE.	-	2		4	5	-	2		4		0	i 🗖				
			<ul> <li>Describe different types of PPE, appropriate selection, proper usage and its limitations for</li> </ul>																
			various work tasks.											0	4				
			<ul> <li>Describe the proper maintenance/care and storage of PPE in accordance with the</li> </ul>												1				
			manufacturer's instructions.											0	iL				
			Explain your responsibility and the importance of wearing PPE that is appropriate for the												1				
			work-task.											0	ιL				
¹²¹ QH	HSE	30 Manual Handling/Ergonomics/Posture	<ul> <li>Demonstrate how to support a load when walking with various size loads.</li> </ul>											0					
			<ul> <li>Demonstrate the ergonomic posture to take when physically lifting and setting a load.</li> </ul>											0					
			<ul> <li>Describe when mechanical lifting is preferred to manual lifting and why.</li> </ul>		ļ									0					
			<ul> <li>Describe where the force is concentrated on the spine when improperly lifting or setting a</li> </ul>												1				
			load.		ļ					ļ				0	i				
			<ul> <li>Explain the company's policy and procedures on the manual handling/lifting of materials.</li> </ul>											0	i				
			Explain the importance of planning your path of movement prior to lifting and carrying a												4				
			load.		ļ					ļ				0	I				
			<ul> <li>Explain the proper manual lifting or setting techniques to prevent back injuries as well as</li> </ul>												4				
			the benefits of using mechanical lifting devices.											0	ı —				
422			<ul> <li>Explain the value of manually "testing a load" before attempting to lift the load.</li> </ul>	_	ļ		_			<u> </u>	<u> </u>	<u> </u>		0	ı –	_		_	
122 QH	HSE	31 Confined Space Entry	<ul> <li>Describe what constitutes a confined space entry.</li> </ul>		ļ									0					
			<ul> <li>Explain how environmental conditions can negatively impact working in a confined space.</li> </ul>		ļ					<u> </u>		ļ	ļ	0					
			<ul> <li>Explain the company's policy on confined space entry.</li> </ul>											0	1 H				
			<ul> <li>Explain the hazards associated with a contined space.</li> </ul>											0	ı				
			Explain the importance of using atmospheric monitoring equipment in a contined space.																
			<ul> <li>Explain the procedures to take before entering a confined space.</li> </ul>							+				0					
			<ul> <li>Explain the procedures to take upon entering a confined space.</li> <li>Evaluate the required DDE needed when working in a confined space.</li> </ul>				-							0					
			<ul> <li>Explain the required PPE needed when working in a commed space.</li> <li>Evaluation what a component parson is in the context of regulatory standards covoring.</li> </ul>				-			1	1			0	1 H				
			<ul> <li>Explain what a competent person is in the context of regulatory standards covering confined space entry.</li> </ul>											0	4				
			Evaluation what a qualified person is in the context of regulatory standards covering confined																
			<ul> <li>Explain what a qualified person is in the context of regulatory standards covering commed space entry.</li> </ul>											0	4				
			Explain what and how to identify a confined space and give some examples on your				-			1	1								
			worksite											0	1				
			Explain why it is important to continually monitor the atmosphere of a confined space				-							0					
			<ul> <li>Explain vour role and responsibility during a confined space rescue operation.</li> </ul>		1					+				0					
123 OH	HSE	32 Severe Weather Conditions	<ul> <li>Demonstrate the ability to recognize operational shut down point(s).</li> </ul>				1		-		1			0	i 🗖				
Q.1			<ul> <li>Describe actions to be taken to protect personnel during severe weather conditions.</li> </ul>		1					1	1			0	1 -				
			Describe operations which may be impacted by severe weather and the actions taken to		1					1	1	1			1				
			mitigate it.											0	ı I				
			Describe the process to restart operations after a severe weather event.		1					1		1		0	1				
			Describe the process to secure the unit, before evacuating, when a severe weather alert												1				
			has been issued.											0	i				
			Explain the company's policy and procedures to follow during a severe weather threat.		1									0	1				

# Annex-11 : Competency Table: – Assistant Driller 16/18

Position	: Assi	istant Driller		Co	ompete	ncy leve	el require	ed		Pro	ficiency S	Scale		GAP	Individual Development Plan
					Red	quired S	core			A	ctual Sco	re			
No Co	de No	Eunctional competency	Description of competency	Awarene	Applicat	i Career	Advance	Expert	Awarene	Applicat	Career	Advanced	Expert		
		ranctional competency	Beschption of competency	SS	on	Proficien	d Level	Level	ss	on	Proficient	Level	Level		
			•	1	2	t	4	5	1	2	3	4	5		
124 QH	ISE 33	Fire Prevention, Fire Fighting and Fire Control	<ul> <li>Demonstrate the use of portable fire extinguishers.</li> </ul>												
		and Gas/Fire Detection Equipment											ļ	0	
			<ul> <li>Describe the company's policies and procedures for fire prevention.</li> </ul>		<b> </b>	-+					+			0	
			<ul> <li>Describe the different types of portable fire extinguishers and their applications (Water,</li> </ul>												
			Carbon Dioxide and Dry Chemical).											0	
			<ul> <li>Describe the engine shutdown procedure in the event of a gas release.</li> </ul>											0	
			<ul> <li>Describe the fired and gas detection systems, sensor locations and now they function.</li> <li>Describe the fixed and/or particular systems used to detect the presence of Ovygen (O2).</li> </ul>				-							0	
			<ul> <li>Describe the fixed and/or portable systems used to detect the presence of Oxygen (O2), Undependent (UC) and Undependent Sulphide (U2C), etc.</li> </ul>											0	
			Describe the passive fire protection systems on the unit including their location and		<u> </u>					+					
			Describe the passive fire protection systems on the unit, including their location and     rating											0	
			Describe the process and documentation needed for inspecting and maintaining portable			+								0	
			fire extinguishers											0	
			<ul> <li>Describe the process for inspecting maintaining testing and calibrating the fire and gas</li> </ul>							+					
			detection systems											0	
			Describe the testing and regulatory requirements for nortable fire extinguishers							+				0	
			<ul> <li>Describe the three elements to complete the fire triangle</li> </ul>							1				0	
			<ul> <li>Describe the thresholds and the actions automatically initiated on detection of HC and/or</li> </ul>											-	
			H2S.											0	
			Explain the different levels of shutdown associated with the unit (if applicable).											0	
			Explain the rig/unit emergency action (response) plan for a fire event.											0	
			<ul> <li>Explain the use of portable fire extinguishers.</li> </ul>											0	
125 QH	ISE 34	Occupational Health Plan	Explain the process for monitoring occupational health exposures.											0	
			<ul> <li>Explain the company occupational health protection plan.</li> </ul>											0	
			<ul> <li>Explain the exposures (noise, vibration, heat, etc) that are unacceptable.</li> </ul>											0	
			<ul> <li>Explain the process to identify, set, control and verify the exposure limits that could</li> </ul>												
			prevent potential acute and or chronic health hazards.											0	
126 QH	ISE 35	Simultaneous Operations	<ul> <li>Describe management of change and why it is important when conducting SIMOPS</li> </ul>												
			operations.		ļ							ļ		0	
			<ul> <li>Describe what constitutes a SIMOPS Plan.</li> </ul>											0	
			Explain Stop Work Authority and who is responsible to initiate when a potential risk is												
			present.		ļ									0	
			<ul> <li>Explain the elements of the SIMOPS Plan.</li> </ul>		ļ									0	
			<ul> <li>Explain the summary of operational boundaries and the difference between proceed,</li> </ul>												
		· · · · · · · · · · · · · · · · · · ·	proceed with caution and stop operations.		<u> </u>									0	
127 QH	ISE 36	Powered/Manual Tools	<ul> <li>Describe your company's powered/manual tool policy.</li> </ul>		ļ	4				+		ļ	ļ	0	
			<ul> <li>Explain the importance of inspection, maintenance and storage of powered/manual tools.</li> </ul>		ļ							ļ	ļ	0	
			<ul> <li>Explain the importance of removing defective or altered powered/manual tools.</li> </ul>		ļ								ļ	0	
			<ul> <li>Explain the importance of using the proper powered/manual tool for the task at hand.</li> </ul>		ļ							ļ	ļ	0	
			<ul> <li>Explain the required PPE and safe procedures for operating powered/manual tools.</li> </ul>		1	1	1			1	1	1		0	

# Annex-11 : Competency Table: – Assistant Driller 17/18

Position: Assistant Driller		Co	ompeter	ncy leve	l requir	ed		Prof	iciency S	cale		GAP	Individual Development Plar
			Req	uired So	core			Ac	tual Sco	re			
No Code No Functional competency	Description of competency	Awarene	Applicati	Career	Advance	Expert	Awarene	Applicati	Career	Advanced Exp	ert		
		SS	on	Proficien	d Level	Level	SS	on	Proficient	Level Le	vel		
128 PM A1 Document Centrel	Demonstrate how handover records are filed and maintained		2	t	4	5	1	2	3	4	5	0	
	<ul> <li>Demonstrate how handover records are need and maintained.</li> <li>Demonstrate the ability to apply action items contained in the communication document.</li> </ul>		+										
	Alerts /Notifications /Rest Practices) through closure											0	
	Demonstrate the ability to communicate to all current operations		+	<u> </u>	+	+		<u>}</u>					
	<ul> <li>Demonstrate the ability to complete a handover report, note and form</li> </ul>				+	1						0	
	<ul> <li>Demonstrate the ability to store inventory items including dangerous goods</li> </ul>		1	1	1			1				0	
	Demonstrate the execution and application of a management of change request.		1	1	1	1		1				0	
	<ul> <li>Demonstrate the handover procedure.</li> </ul>		1	t	1	1		t				0	
	Describe the personnel involved in the development, implementation and maintenance of		1		1								
	written policy and procedure standards.											0	
	Describe where operational documentation is maintained.											0	
	Explain how each business unit will utilize the quality and control system.		1	1				1	Í			0	
	Explain how written policy and procedure standards are implemented into the current												
	workforce and new hire process.											0	
	Explain the Company policy and procedure for the handover process.											0	
	Explain the Company policy and procedures for the storage of inventory items including												
	dangerous goods.											0	
	<ul> <li>Explain the Company policy and procedures on operations and HSE communications.</li> </ul>											0	
	<ul> <li>Explain the Company policy on documentation control.</li> </ul>											0	
	<ul> <li>Explain the Company process for issuing, distributing and responding to communication</li> </ul>												
	documents (Alerts/Notifications/Best Practices).		ļ	ļ				ļ				0	
	Explain the Company process for maintaining the daily drilling reports.		ļ	ļ		1		ļ				0	
	Explain the Company's material inventory and parts list including the vendor's												
	nomenclature (name) of the part.											0	
	Explain the Company's policies and procedures for quality control.		ļ	ļ		1		ļ				0	
	Explain the Company's process for the development of written policy and procedure												
	standards.		ļ	ļ		ļ						0	
	Explain the Company's policy and procedures for inventory management.											0	
	Explain the Company's policy for management of change.			<u> </u>		-		<u> </u>				0	
	Explain the Company's procedure for document tracking and retention.		<u> </u>	<u> </u>				<u> </u>				0	
	<ul> <li>Explain the Company's procedures for a management of change, including team</li> </ul>											0	
	Evaluation the desumentation control precedure and which percented are involved in the											0	
	<ul> <li>Explain the documentation control procedure and which personnel are involved in the filing of exercising documentation.</li> </ul>											0	
	Explain the importance of effective document control		<u> </u>			+						0	
	<ul> <li>Explain the importance of encuring that handover reports are understood and signed off</li> </ul>					1							
	<ul> <li>Explain the importance of ensuing that handover reports are understood and signed on by outgoing and incoming personnal</li> </ul>											0	
	Fxplain the importance of handover reports		1	ł				ł				0	
	<ul> <li>Explain the importance of operations and HSE communications throughout the Company.</li> </ul>		1	1								0	
	<ul> <li>Explain what quality and control system is used by the Company.</li> </ul>		†	1	1	1		1				0	
	<ul> <li>Explain who is responsible for revising documentation and describe how to recognize the</li> </ul>		1	<u> </u>	1	1		<u> </u>				ĭ	
	latest version.	11	1	1				1				0	
	Explain who is responsible for updating the HSE policy and procedures and what is the		1	t	1	1		t					
	process.	11					1					0	
	<ul> <li>Explain why proper review, approval and document control are essential parts of</li> </ul>					1							
	management of change requests.	11										0	

# Annex-11 : Competency Table: – Assistant Driller 18/18

Position: Assista	ant Driller		С	ompete	ncy leve	el requir	ed		Pro	oficiency	Scale		GAP	Individual Development Plan
				Rec	quired S	core			A	ctual Sco	ore			
No Code No	Functional competency	Description of competency	Awarene ss	Applicati on	Career Proficien	Advance d Level	Expert Level	Awarene ss	e Applicat on	Career Proficien	Advanced t Level	Expert Level		
¹²⁹ SS 17 Tra	insportation	<ul> <li>Demonstrate the proper procedure to approach the helicopter when boarding and exiting the aircraft.</li> <li>Describe the Company's helicopter transportation policy.</li> <li>Describe the Company's motor vehicle policy.</li> <li>Describe the emergency response procedures and equipment associated with helicopter operations.</li> <li>Describe the importance of journey management (trip planning).</li> <li>Describe the proper procedure to approach the helicopter when boarding and exiting the aircraft.</li> <li>Describe what constitutes being fit for duty when operating a motor vehicle.</li> <li>Explain the importance of a "walk around" inspection (fluids, fuel, tire pressure etc.) before entering a vehicle and putting it into motion.</li> <li>Explain who is in total command of the helicopter and who will make decisions concerning the flight and personnel allowed onboard.</li> </ul>									4			
			Mavin		0			Actual	Score	0			0	

# Annex-12 : Competency Table: – Driller 1/20

Position:	Driller			С	ompete	ncy leve	l require	ed		Profi	iciency S	Scale		GAP	Individual	Develop	oment Plan
					Rec	uired So	core			Ac	tual Sco	re					
No Ref	Code Funct	tional competency	Description of competency	Awaren	Applicati	Career	Advance	Expert	Awaren	Applicati	Career	Advance Exp	ert		-		
no ne		inential competency		SS	on	Proficien	d Level	Level	ess	on	Proficie	d Level Le	vel				
1 CO	01 Crane Basics		<ul> <li>Describe the lifting equipment available on current location.</li> </ul>											0			
			<ul> <li>Describe the type(s) of crane(s) by name and type, found on current location.</li> </ul>											0			
2 CO	02 Rigger Basics		<ul> <li>Demonstrate ability to use all rigging hitches (e.g., basket, choker, vertical, bridle) needed</li> </ul>														
			for the current job.											0			
			<ul> <li>Demonstrate adhering to the permit-to-work for routine and non-routine rigging tasks, if</li> </ul>														
			applicable			ļ								0			
			<ul> <li>Demonstrate correct and safe use of taglines attached to loads, including proper</li> </ul>														
			positioning and quantity			ļ								0		_	
			<ul> <li>Demonstrate following the lift plan required for critical lift rigging tasks.</li> </ul>											0			
			<ul> <li>Demonstrate how to correctly rig a load according to its specific center of gravity.</li> </ul>											0			
			<ul> <li>Demonstrate the ability to control an area where lifting operations are being carried out.</li> </ul>											0			
			<ul> <li>Demonstrate the ability to correctly and safely connect/disconnect loads.</li> </ul>											0			
			<ul> <li>Demonstrate the ability to correctly secure cargo in various conditions.</li> </ul>			<b> </b>								0			
			<ul> <li>Demonstrate the ability to find the center of gravity of a load.</li> </ul>											0			
			<ul> <li>Demonstrate the ability to select the appropriate rigging equipment for a specific job.</li> </ul>											0			
			<ul> <li>Demonstrate the use of sling capacity tables.</li> </ul>			<u> </u>								0			
			<ul> <li>Determine and/or estimate weight of loads for the purpose of rigging safely</li> </ul>											0			
			<ul> <li>Explain center or gravity as it relates to rigging.</li> </ul>											0			
			<ul> <li>Explain now the tension or loading increases as sling angles decrease, especially the rapid is seen in tension that seems when slines are used to law 20 decrease.</li> </ul>											0			
			Increase in tension that occurs when slings are used below 30 degrees.											0			
			<ul> <li>Explain the unreferred methods in which a sings are figged of attached to load.</li> <li>Explain the importance of the over of a sumthetic web and why it should never be used or</li> </ul>											0			
			<ul> <li>Explain the importance of the eye of a synthetic web and why it should never be used of forced ever a back or pip.</li> </ul>											0			
			<ul> <li>Evaluate the importance of using padding (protection over sharp edges)</li> </ul>											0			
			Explain the importance of using padding (protection over sharp edges).     Explain the use of puch poles, if required by company policy.		+	+				+				0			
			<ul> <li>Explain the use of push poles, in required by company poley.</li> <li>Explain vertical and horizontal planes as they relate to rigging (e.g. how force is</li> </ul>		+												
			distributed based on the plane)											0			
			<ul> <li>Locate company policies and procedures that apply to rigging</li> </ul>											0			
			<ul> <li>Select correct slings, or other similar lifting devices, according to size, weight, and</li> </ul>		+												
			configuration.											0			
3 CO	03 General Rigger	Qualifications and Role	Explain the basic rigger's role in ensuring safe lifting operations.		1									0			
со	03 General Rigger	Qualifications and Role	Explain the basic rigger's role in ensuring that all lifting gear is certified to company and			1											
			regulatory requirements.											0			
со	03 General Rigger	Qualifications and Role	Explain who at the jobsite is authorized to use rigging hardware.			1								0			
со	03 General Rigger	Qualifications and Role	<ul> <li>List the recommended qualifications, experience, and training necessary to be able to rig a</li> </ul>		1	1									-		
			load (see API RP 1e, 2d, latest edition).											0			
4 CO	04 General Rigging	Hardware Information	Describe the proper installation and rigging of all permanent and temporary lifting points		1												
			(anchor points, pad eyes, etc.).											0			
			<ul> <li>Describe the storage requirements for all rigging hardware (rigging/slings/shackles, etc.).</li> </ul>											0			
5 CO	05 Rigging Hardwa	re Inspection & Maintenance	Demonstrate ability to maintain and inspect hand and power tools in operationally safe														
			condition, without any unauthorized modifications.											0			
			<ul> <li>Explain procedures to follow when defective rigging hardware is identified.</li> </ul>											0			
			<ul> <li>Explain the lifting gear color-coding system and how records are kept for each item</li> </ul>											0			
6 CO	10 General Crane C	Operation HSE	<ul> <li>Explain why personnel should observe and report any fluid leaks from the crane that could</li> </ul>														
			be contaminating the work environment and affecting safe operations.											0			
			<ul> <li>Explain your Stop Work Authority when you observe an unsafe act during lifting</li> </ul>														
			operations			Ļ								0	+		
7 CO	15 General Rigging	; HSE	<ul> <li>Demonstrate ability to ensure that deck personnel use safe lifting procedures (e.g., tag</li> </ul>														
			lines, escape routes).			ļ				ļ				0			
			<ul> <li>Demonstrate correct use of personal protective equipment.</li> </ul>			L			_					0	+		
⁸ CO	16 Crane/Rigging C	Operations Communications	<ul> <li>Demonstrate ability to write clear and concise reports, such as those involving near-</li> </ul>	1	1									1			
			misses and incidents, involving lifting operations.	1	1	1	1		1	1	. 1	1		0			

#### Annex-12 : Competency Table: – Driller 2/20

Image: Process and the second complexity of the program of the second complexity is the program of the second complexity is the program of the second complexity is the program of the second complexity is the program of the second complexity is the program of the second complexity is the program of the second complexity is the program of the second complexity is the program of the second complexity is the program of the second complexity is the program of the second complexity is the program of the second complexity is the program of the second complexity is the program of the second complexity is the program of the second complexity is the program of the second complexity is the program of the second complexity is the program of the second complexity is the program of the second complexity is the program of the second complexity is the program of the second complexity is the program of the second complexity is the program of the second complexity is the program of the second complexity is the program of the second complexity is the program of the second complexity is the program of the second complexity is the program of the second complexity is the program of the second complexity is the program of the second complexity is the program of the second complexity is the program of the second complexity is the program of the second complexity is the program of the second complexity is the program of the second complexity is the program of the second complexity is the program of the second complexity is the program of the second complexity is the program of the second complexity is the program of the second complexity is the program of the second complexity is the program of the second complexity is the program of the second complexity is the program of the second complexity is the program of the second complexity is the program of the second complexity is the program of the second complexity is the program of the second complexicom of the second complexity is the program of the second complex	Position:	Driller		Competency level required						Prof	iciency	Scale		GAP	Individu	ual Develo	opment Plan
No. Ref         Code         Functional competency         Descriptional Competency         Non-anti-advance Support         Non-advance Support         Non					Requ	uired Sc	ore			Ac	tual Sco	ore					
P         C0         17         Presente: Utility Operation:         Discretizer has to specify (tills propried (till propried (till propried (till propried (till propried (till propried (till propried (till propried (till propried (till propried (till propried (till propried (till propried (till propried (till propried (till propried (till propried (till propried (till propried (till propried (till propried (till propried (till propried (till propried (till propried (till propried (till propried (till propried (till propried (till propried (till propried (till propried (till propried (till propried (till propried (till propried (till propried (till propried (till propried (till propried (till propried (till propried (till propried (till propried (till propried (till propried (till propried (till propried (till propried (till propried (till propried (till propried (till propried (till propried (till propried (till propried (till propried (till propried (till propried (till propried (till propried (till propried (till propried (till propried (till propried (till propried (till propried (till propried (till propried (till propried (till propried (till propried (till propried (till propried (till propried (till propried (till propried (till propried (till propried (till propried (till propried (till propried (till propried (till propried (till propried (till propried (till propried (till propried (till propried (till propried (till propried (till propried (till propried (till propried (till propried (till propried (till propried (till propried (till propried (till propried (till propried (till propried (till propried (till propried (till propried (till propried (till propried (till propried (till propried (till propried (till propried (till propried (till propried (till propried (till propried (till propried (till propried (till propried (till propried (till propried (till propried (till propried (till propried (till propried (till propried (till propried	No Ref	Code Functional competency	Description of competency	Awarene	Applicati	Career	Advance	Expert	Aware	n Applicat	i Career	Advance	Expert				
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	° CO	17 Personnei: Litting Operations	Demonstrate now to properly utilize personnel lifting equipment.														+
			Demonstrate now to select the proper personnel lifting equipment/device.											0			
			<ul> <li>Explain conditions, authority, and hand signals necessary to stop personnel lifting</li> </ul>														
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14       CO       14       Offbaard/Chickand Supply Road Lifting <ul> <li>Demonstrate how to perpendy utilize personnel fifting equipment/device.</li> <li>Demonstrate how to select the proper personnel fifting equipment/device.</li> <li>Demonstrate how to select the proper personnel fifting equipment/device.</li> <li>Demonstrate how to select the proper personnel fifting equipment/device.</li> <li>Demonstrate how to select the proper personnel fifting equipment/device.</li> <li>Demonstrate how to select the proper personnel fifting equipment/device.</li> <li>Demonstrate how to select the proper personnel fifting equipment/device.</li> <li>Demonstrate how to select the proper personnel fifting equipment/device.</li> <li>Demonstrate how to select the proper personnel are the proper personnel are the proper personnel are the proper personnel are the proper personnel are the proper personnel are the proper personnel are the proper personnel are the proper personnel are the proper personnel are the proper personnel are the proper personnel are the proper personnel are the proper personnel are the proper personnel are the proper personnel are the proper personnel are the proper personnel are the proper personnel are the proper personnel are the proper personnel are the proper personnel are the proper personnel are the proper personnel are the proper personnel are the proper personnel are the proper personnel are the proper personnel are the proper personnel are the proper personnel are the proper personnel are the proper personnel are the proper personnel are the proper personnel are the proper personnel are the proper personnel are the proper personnel are the proper personnel are the proper personnel are the proper personnel are the proper personnel are the proper personnel are the proper personnel are the proper personnel are t</li></ul>			transferred or lifted											0			
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		Operations												0			
			<ul> <li>Demonstrate how to select the proper personnel lifting equipment/device.</li> </ul>							-	1			0	-		
			Describe the basic work sequence/policy followed prior to making a critical lift.							-	1			0	-		
Performance     Performance     Performance     Performance     Performance     Performance     Performance     Performance     Performance     Performance     Performance     Performance     Performance     Performance     Performance     Performance     Performance     Performance     Performance     Performance     Performance     Performance     Performance     Performance     Performance     Performance     Performance     Performance     Performance     Performance     Performance     Performance     Performance     Performance     Performance     Performance     Performance     Performance     Performance     Performance     Performance     Performance     Performance     Performance     Performance     Performance     Performance     Performance     Performance     Performance     Performance     Performance     Performance     Performance     Performance     Performance     Performance     Performance     Performance     Performance     Performance     Performance     Performance     Performance     Performance     Performance     Performance     Performance     Performance     Performance     Performance     Performance     Performance     Performance     Performance     Performance     Performance     Performance     Performance     Performance     Performance     Performance     Performance     Performance     Performance     Performance     Performance     Performance     Performance     Performance     Performance     Performance     Performance     Performance     Performance     Performance     Performance     Performance     Performance     Performance     Performance     Performance     Performance     Performance     Performance     Performance     Performance     Performance     Performance     Performance     Performance     Performance     Performance     Performance     Performance     Performance     Performance     Performance     Performance     Performance     Performance     Performance     Performance     Performance     Performance     Performance     Performance     Performan			Explain conditions, authority, and hand signals necessary to stop personnel lifting	*****						-	1						
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before and during personent transfer.     Explain the preculsions alory of infragrimments applicable before personnel are     transferred or lifted.     Constraint elange and organizing the work area upon completion of the work, task or     repairs.     Explain the preculsions alory of infragrimments applicable before personnel are     transferred or lifted.     Constraint elange and organizing the work area upon completion of the work, task or     repairs.     Explain the preculsions alory of infragrimments and uning thing operations.     Explain the reset on sign workthmen to important area: during transit.     Constraint elange and organizing methods and techniques to position in one to be able to position in one well center.     Center     Center     Center     Constraint elability to coach diffice personnel and thing aperations.     Center     Cen			• Explain the importance of load balance, weight tolerances, and environmental conditions								1						
13 CO 20 General Housekeeping/Orderlines Epilain the pre-automs and pre-lift equiprements applicable before personnel are transformed or the work, task or registry.   13 CO 20 General Housekeeping/Orderlines Epilain procedures personnel about follow if they observe worksite and water pollutats outright operations. Image: Control of the work, task or registry.   14 DL 01 RI, Move (Skidding/Walking): Skidding RIP Demonstrate Control to secure the BOP for transit. Image: Control of the work, task or registry.   12 DL 02 RIK, Move (Skidding/Walking): Location of Hole Demonstrate ability to coach drill crews on how to be able to position rig on well center. Center Image: Control of the work area dring transit. Image: Control of the work area dring transit.   13 DL 02 RIK Move (Skidding/Walking): Location of Hole Demonstrate ability to coach drill crews on how to be able to position rig on well center. Center Image: Control of the work area dring transit. Image: Control of the work area dring transit.   13 DL 03 RIK Move (Skidding/Walking): Location of Hole Demonstrate ability to coach drill crews on how to be able to position rig on well center. Center Image: Control of the work area dring transit. Image: Control of the work area dring transit.   13 DL 03 RIK Move (Skidding/Walking): Location of Hole Demonstrate ability to coach drill crews on how to be able to position rig on well center. Center Image: Control of the work area dring transit.   14 01 03 RIK Move (Skidding/Walking): Location of Hole Demonstrate ability to			before and during personnel transfer.											0			
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11       C0       20       General Housekeeping/Orderlines <ul> <li>Demostrate claming and organizing the work area upon completion of the work, task, or regars.</li> <li>Explain procedures personel should follow if they observe worksite and water pollutants.</li> <li>D1             <li>D1             <li>Rig More (Skidding/Waiking): Location of Hole</li> <li>Demostrate ability to supprede</li> <li>Explain the need to assign watchmen to important areas during transit.</li> <li>Demostrate ability to supprede</li> <li>Explain the need to assign watchmen to important areas during transit.</li> <li>Demostrate ability to supprede</li> <li>Explain the need to assign watchmen to important areas during transit.</li> <li>Demostrate ability to installe context measuring methods and techniques to position rig on well center</li> <li>Demostrate ability to installe context measuring methods and techniques to position rig on well center</li> <li>Demostrate the ability to install chek, flow, flare, and diverter lines.</li> <li>Demostrate ability to install chek, flow, flare, and diverter lines.</li> <li>Demostrate ability to install chek, flow, flare, and diverter lines.</li> <li>Demostrate ability to install chek, flow, flare, and diverter lines.</li> <li>Demostrate ability to install chek, flow, flare, and diverter lines.</li> <li>Demostrate ability to install chek, flow, flare, and diverter lines.</li> <li>Demostrate ability to install chek, flow, flare, and diverter lines.</li> <li>Demostrate ability to install chek, flow, flare, and there rines.</li> <li>Demostrate ability to inspect and tighten all hammer seal unions to equalter and mund intex as pering design.</li> <li>Demonostrate</li></li></li></ul>			transferred or lifted.											0			
12       DL       01       Rig Move (Skidding/Walking): Skidding Walking): Location of Hole       Demonstrate ability to secure the BOP for transit.       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0	¹¹ CO	20 General Housekeeping/Orderliness	<ul> <li>Demonstrate cleaning and organizing the work area upon completion of the work, task, or</li> </ul>														
Explain proceedings personnel should follow if they observe worksite and water pollutants     during lifting operations.     if the operation of the operation of the operation of the operation of the operation of the operation of the operation of the operation of the operation of the operation of the operation of the operation of the operation of the operation of the operation of the operation of the operation of the operation of the operation of the operation of the operation of the operation of the operation of the operation of the operation of the operation of the operation of the operation of the operation of the operation of the operation of the operation of the operation of the operation of the operation of the operation of the operation of the operation of the operation of the operation of the operation of the operation of the operation of the operation of the operation of the operation of the operation of the operation of the operation of the operation of the operation of the operation of the operation of the operation of the operation of the operation of the operation of the operation of the operation of the operation of the operation of the operation of the operation of the operation of the operation of the operation of the operation of the operation of the operation of the operation of the operation of the operation of the operation of the operation of the operation of the operation of the operation of the operation of the operation of the operation of the operation of the operation of the operation of the operation of the operation of the operation of the operation of the operation of the operation of the operation of the operation of the operation of the operation of the operation of the operation of the operation of the operation of the operation of the operation of the operation of the operation of the operation of the operation of the operation of the operation of the operation of the operation of the operation of the operation operating the operation of the operation of the operation of th			repairs.											0			
11       DL       01       Rig Move (Skidding/Walking): Skidding Rig with 80P Suspended       Demonstrate how socarce the 80P for transit.       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0			• Explain procedures personnel should follow if they observe worksite and water pollutants														
11       DL       0.1       Nig Move (Skidding/Walking): Skidding Rig with BOP Suspended <ul> <li>Explain the need to assign watchmen to important areas during transit</li> <li>Explain the need to assign watchmen to important areas during transit</li> <li>DL       0.2       Nig Move (Skidding/Walking): Skidding Rig With BOP Suspended       0       0       0           12         DL         0.2         Nig Move (Skidding/Walking): Locatori dill crews on how to be able to position rig on well center.         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0</li></ul>			during lifting operations.											0			
1 Explain the need to assign watchmen to important areas during transit 0 0 0   2 Big Move (Skidding/Walking): Location of Hole Center Demonstrate ability to coach drill rews on how to be able to position rig on well center. 0 0 0   1 Demonstrate ability to coach drill rews on how to be able to position rig on well center. 0 0 0 0   1 Demonstrate ability to spot matting boards Demonstrate ability to spot matting boards as per rig design. 0 0 0 0   1 DL 0.8 Rig Wove (Skidding/Walking): Unload and install matting boards Demonstrate ability to install choke, flow, flare, and diverter lines. 0 0 0 0   1 DL 0.6 Rig Up: Spot & Assemble Subtructure Base & Associated Bracing Demonstrate ability to ensure only approved and certified lifting equipment. 0 0 0   1 DL 0.6 Rig Up: Spot & Assemble Subtructure Base & Associated Bracing Demonstrate ability to ensure only approved and certified lifting equipment. 0 0 0   1 DL 0.6 Rig Up: Spot & Assemble Subtructure Base & Associated Bracing 0 0 0 0   1 DL 0.8 Rig Up: Spot & Assemble All Demonstrate ability to properly earth ground equipment. 0 0 0   1 DL 0.8 Rig Up: Spot Mud Pumps & Assemble All Demonstrate ability to properly earth ground equipment. 0 0 0   1 DL 0.8 Rig Up: Spot Mud Pumps & Assemble All	11 DL	01 Rig Move (Skidding/Walking): Skidding Rig	<ul> <li>Demonstrate how to secure the BOP for transit.</li> </ul>														
		with BOP Suspended										L		0			
12       DL       0.2       Rig Move (Ekidding/Walking): Location of Hole Center       Demonstrate ability to coach dill crews on how to be able to position rig on well center       Image: Center       Image: Center       Image: Center       Image: Center       Image: Center       Image: Center       Image: Center       Image: Center       Image: Center       Image: Center       Image: Center       Image: Center       Image: Center       Image: Center       Image: Center       Image: Center       Image: Center       Image: Center       Image: Center       Image: Center       Image: Center       Image: Center       Image: Center       Image: Center       Image: Center       Image: Center       Image: Center       Image: Center       Image: Center       Image: Center       Image: Center       Image: Center       Image: Center       Image: Center       Image: Center       Image: Center       Image: Center       Image: Center       Image: Center       Image: Center       Image: Center       Image: Center       Image: Center       Image: Center       Image: Center       Image: Center       Image: Center       Image: Center       Image: Center       Image: Center       Image: Center       Image: Center       Image: Center       Image: Center       Image: Center       Image: Center       Image: Center       Image: Center       Image: Center       Image: Center       Image: Center       Image: Center			<ul> <li>Explain the need to assign watchmen to important areas during transit</li> </ul>								<u> </u>			0			
Center         Demonstrate ability to utilize correct measuring methods and techniques to position rig on well center         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0 <th0< th="">         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         <th< td=""><td>¹² DL</td><td>02 Rig Move (Skidding/Walking): Location of Hole</td><td><ul> <li>Demonstrate ability to coach drill crews on how to be able to position rig on well center.</li> </ul></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></th<></th0<>	¹² DL	02 Rig Move (Skidding/Walking): Location of Hole	<ul> <li>Demonstrate ability to coach drill crews on how to be able to position rig on well center.</li> </ul>														
13       DL       03       Rig Move (Skidding/Walking): Unload and install matting boards       Demonstrate ability to spot matting boards as per rig design.       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0 <td></td> <td>Center</td> <td>• • • • • • • • • • • • • • • • • • • •</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td> </td> <td></td> <td>0</td> <td></td> <td></td> <td></td>		Center	• • • • • • • • • • • • • • • • • • • •											0			
13       DL       03       Rig Move (Skidding/Walking): Unload and installmatting boards			<ul> <li>Demonstrate ability to utilize correct measuring methods and techniques to position rig</li> </ul>														
13       DL       03       Rig Move (Skidding): Vulking): Well Control install matting boards as per rig design.       0       0       0         14       DL       04       Rig Move (Skidding): Well Control Equipment.       Demonstrate ability to install choke, flow, flare, and diverter lines.       0       0       0       0         15       DL       05       Rig Up: Spot & Assemble Subtructure Base & Associated Bracing.       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0	42		on well center								<u> </u>	ļ	ļ	0	+	<u> </u>	<u> </u>
14       DL       04       Rig Move (Skidding/Waking): Well Control Equipment       Demonstrate the ability to install choke, flow, flare, and diverter lines.       0       0       0         15       DL       05       Rig Up: Unload and install matting boards       Demonstrate ability to encognize approved and certified lifting equipment is utilized.       0       0       0         16       DL       06       Rig Up: Spot & Assemble Subtructure Base & Associated Bracing       Demonstrate ability to inspect and tighten all hammer seal unions to equalizer and mud mixing lines.       0       0       0       0         17       DL       07       Rig Up: Spot & Assemble Shaker Tanks, Intermediate Tanks, Suction Tanks &/or Reserve Tanks       Demonstrate ability to inspect and tighten all hammer seal unions to equalizer and mud mixing lines.       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0	13 DL	03 Rig Move (Skidding/Walking): Unload and installmatting boards	<ul> <li>Demonstrate ability to spot matting boards as per rig design.</li> </ul>											0			
1*       0L       0L <td< td=""><td>14 DI</td><td>04 Pig Move (Skidding (Walking): Well Control</td><td>Demonstrate the ability to install choke flow, flare, and diverter lines</td><td></td><td></td><td></td><td></td><td></td><td></td><td>-</td><td>-</td><td></td><td></td><td>0</td><td>+ +</td><td></td><td></td></td<>	14 DI	04 Pig Move (Skidding (Walking): Well Control	Demonstrate the ability to install choke flow, flare, and diverter lines							-	-			0	+ +		
15       DL       05       Rig Up: Unload and install matting boards <ul> <li>Demonstrate the ability to recognize approved and certified lifting equipment.</li> <li>Demonstrate the ability to spot will base on well center as per rig design.</li> </ul> 0         0         0           16         DL         06         Rig Up: Spot & Assemble Subtructure Base & Associated Bracing <ul> <li>Demonstrate ability to spot will base on well center as per rig design.</li> <li>Demonstrate ability to inspect and tighten all hammer seal unions to equalizer and mud mixing lines.</li> <li>Demonstrate ability to properly earth ground equipment.</li> <li>Demonstrate ability to spot mud tanks level, in proper order and in line as per rig design.</li> <li>Demonstrate ability to spot mud pumps and rig up all associated plumbing and operating lines.</li> <li>Demonstrate ability to spot mud pumps and rig up all associated plumbing and operating lines.</li> <li>Demonstrate ability to spot suitcase level, in proper order and in line as per rig design.</li> <li>Demonstrate ability to spot mud pumps and rig up all associated plumbing and operating lines.</li> <li>Demonstrate ability to spot mud quipment.</li> <li>Demonstrate ability to spot suitcase level, in proper order and in line as per rig design.</li> <li>Demonstrate ability to spot mud quipment.</li> <li>Demonstrate ability to roperly earth ground equipment.</li> <li>Demonstrate ability to spot mud pumps and rig up all associated plumbing and operating lines.</li> <li>Demonstrate ability to spot suitcase level, in proper order and in line as per rig design.</li> <li>D</li></ul>		Equipment	Bemonstrate the ability to instanchoke, now, nare, and diverter lines.											0			
16       Demonstrate the ability to recognize approved and certified lifting eqlupment.       0       0         16       DL       06       Rig Up: Spot & Assemble Subtructure Base & Associated Bracing       Demonstrate ability to spot sub base on well center as per rig design.       0       0       0       0         17       DL       07       Rig Up: Spot & Assemble Shaker Tanks, Intermediate Tanks, Suction Tanks &/or Reserve Tanks       Demonstrate ability to inspect and tighten all hammer seal unions to equalizer and mud mixing lines.       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0	15 DI	05 Big Up: Unload and install matting boards	Demonstrate ability to ensure only approved and certified lifting equipment is utilized.								1			0			
16       DL       06       Rig Up: Spot & Assemble Subtructure Base & Associated Bracing       0       0         17       DL       07       Rig Up: Spot & Assemble Shaker Tanks, Intermediate Tanks, Suction Tanks &/or Reserve Tanks       Demonstrate ability to inspect and tighten all hammer seal unions to equalizer and mud mixing lines.       0       0         18       DL       08       Rig Up: Spot & Assemble Suitcases and lines       Demonstrate ability to inspect and tighten all hammer seal unions between suitcases to prevent fluid or air lease       0       0       0         19       DL       09       Spot & Assemble Suitcases and lines       Demonstrate ability to properly earth ground equipment.       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0			Demonstrate the ability to recognize approved and certified lifting equipment.							-	1			0			
Associated Bracing       Associated Bracing       O       O       O         17       DL       07       Rig Up: Spot & Assemble Shaker Tanks, intermediate Tanks, Suction Tanks &/or Reserve Tanks       Demonstrate ability to inspect and tighten all hammer seal unions to equalizer and mud mixing lines.       Demonstrate ability to properly earth ground equipment.       Demonstrate ability to properly earth ground equipment.       Demonstrate ability to spot mud pumps and rig up all associated plumbing and operating lines.       Demonstrate the ability to spot mud pumps and rig up all associated plumbing and operating lines.       Demonstrate ability to properly earth ground equipment.       Demonstrate ability to properly earth ground equipment.       Demonstrate the ability to spot mud pumps and rig up all associated plumbing and operating lines.       Demonstrate ability to properly earth ground equipment.       Demonstrate ability to properly earth ground equipment.       Demonstrate ability to spot sultcases to prevent fluid or air leaks       Demonstrate ability to properly earth ground equipment.       Demonstrate ability to spot sultcase level, in proper order and in line as per rig design.       Demonstrate ability to properly earth ground equipment.       Demonstrate	16 DL	06 Rig Up: Spot & Assemble Subtructure Base &	Demonstrate ability to spot sub base on well center as per rig design.								1					_	
17       DL       07       Rig Up: Spot & Assemble Shaker Tanks, Intermediate Tanks, Suction Tanks &/or Reserve Tanks <ul> <li>Demonstrate ability to inspect and tighten all hammer seal unions to equalizer and mud inixing lines.</li> <li>Demonstrate ability to properly earth ground equipment.</li> <li>Demonstrate ability to spot mud tanks level, in proper order and in line as per rig design.</li> </ul> <ul> <li>Demonstrate ability to spot mud pumps and rig up all associated plumbing and operating lines.</li> <li>Demonstrate ability to properly earth ground equipment.</li> <li>Demonstrate ability to spot mud pumps and rig up all associated plumbing and operating lines.</li> <li>Demonstrate ability to properly earth ground equipment.</li> <li>Demonstrate ability to properly install all electricity connections and fuel lines.</li> <li>Demonstrate ability to properly install all electricity connections and fuel lines.</li> <li>Demonstrate ability to spot power package &amp; fuel tank level, in proper order and in line as per rig design.</li> <li>Demonstrate ability to spot power package &amp; fuel tank level, in proper order and in line as per rig design.</li> <li>Demonstrate ability to spot power package &amp; fuel tank level, in proper orde</li></ul>		Associated Bracing												0			
Intermediate Tanks, Suction Tanks &/or Reserve Tanks	¹⁷ DL	07 Rig Up: Spot & Assemble Shaker Tanks,	Demonstrate ability to inspect and tighten all hammer seal unions to equalizer and mud														
Preserve Tanks <ul> <li>Demonstrate ability to properly earth ground equipment.</li> <li>Demonstrate ability to spot mud tanks level, in proper order and in line as per rig design.</li> <li>18       DL       08       Rig Up: Spot Mud Pumps &amp; Assemble All Suction Lines, Pressure Release Lines &amp; Braces       Demonstrate ability to spot mud pumps and rig up all associated plumbing and operating lines.       Demonstrate ability to spot mud pumps and rig up all associated plumbing and operating lines.       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0&lt;</li></ul>		Intermediate Tanks, Suction Tanks &/or	mixing lines.														
Demostrate ability to properly earth ground quipment. Demostrate ability to spot mud tanks level, in proper order and in line as per rig design. 19 DL 09 Spot & Assemble Suitcases and lines - Demostrate ability to spot mud pumps and rig up all associated plumbing and operating lines. Demostrate ability to ispect and tighten all hammer seal unions between suitcases to prevent tability to spot suitcase level, in proper order and in line as per rig design. Demostrate ability to spot suitcase level, in proper order and in line as per rig design. Demostrate ability to spot suitcase level, in proper order and in line as per rig design. Demostrate ability to spot suitcase level, in proper order and in line as per rig design. Demostrate ability to spot suitcase level, in proper order and in line as per rig design. Demostrate ability to spot suitcase level, in proper order and in line as per rig design. Demostrate ability to spot suitcase level, in proper order and in line as per rig design. Demostrate ability to spot suitcase level, in proper order and in line as per rig design. Demostrate ability to spot spot spot spot spot spot spot s		Reserve Tanks												0			
18       DL       0.9       Spot & Assemble All Suction Lines, Pressure Release Lines & Braces       Demonstrate ability to spot mud pumps and rig up all associated plumbing and operating lines.       Demonstrate ability to spot mud pumps and rig up all associated plumbing and operating lines.       Demonstrate ability to spot mud pumps and rig up all associated plumbing and operating lines.       Demonstrate ability to spot mud pumps and rig up all associated plumbing and operating lines.       Demonstrate ability to spot mud pumps and rig up all associated plumbing and operating lines.       Demonstrate ability to spot mud pumps and rig up all associated plumbing and operating lines.       Demonstrate ability to spot mud pumps and rig up all associated plumbing and operating lines.       Demonstrate ability to spot mud pumps and rig up all associated plumbing and operating lines.       Demonstrate ability to spot mud pumps and rig up all associated plumbing and operating lines.       Demonstrate ability to spot mud pumps and rig up all associated plumbing and operating lines.       Demonstrate ability to spot mud pumps and rig up all associated plumbing and operating lines.       Demonstrate ability to spot pump rig associated plumbing and operating lines.       Demonstrate ability to spot spot and tig then all hammer seal unions between suitcases to prevent fluid or air leaks       Demonstrate ability to properly arth ground equipment.       Demonstrate ability to properly install all electricity connections and fuel lines.       Demonstrate ability to spot power package & fuel tank level, in proper order and in line as per originaria.       Demonstrate ability to spot power package & fuel tank level, in proper order and in line as per originaria.       Demonstrate ability to spot power packa			<ul> <li>Demonstrate ability to properly earth ground equipment.</li> </ul>											0			
18       DL       08       Rig Up: Spot Mud Pumps & Assemble All Suction Lines, Pressure Release Lines & Braces       Demonstrate ability to spot mud pumps and rig up all associated plumbing and operating lines.       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0			<ul> <li>Demonstrate ability to spot mud tanks level, in proper order and in line as per rig design.</li> </ul>											0			
Suction Lines, Pressure Release Lines & Braces       operating lines.       operating lines. <thoperating lines.<="" th="">       operating lines.       op</thoperating>	¹⁸ DL	08 Rig Up: Spot Mud Pumps & Assemble All	<ul> <li>Demonstrate the ability to spot mud pumps and rig up all associated plumbing and</li> </ul>														
19       DL       09       Spot & Assemble Suitcases and lines       Demonstrate ability to inspect and tighten all hammer seal unions between suitcases to prevent fluid or air leaks       Demonstrate ability to inspect and tighten all hammer seal unions between suitcases to prevent fluid or air leaks       Demonstrate ability to properly earth ground equipment.       Demonstrate ability to properly install all electricity connections and fuel lines.       Demonstrate ability to properly earth ground equipment.       Demonstrate ability to properly install all electricity connections and fuel lines.       Demonstrate ability to properly earth ground equipment.       Demonstrate ability to properly earth ground equipment.       Demonstrate ability to properly install all electricity connections and fuel lines.       Demonstrate ability to properly earth ground equipment.       Demons		Suction Lines, Pressure Release Lines & Braces	operating lines.								ļ			0			
20       DL       10       Rig Up: Spot & Rig up Rig Power Package & Fuel Tank       Demonstrate ability to properly enth ground equipment.       Demonstrate ability to properly install all electricity connections and fuel lines.       Demonstrate ability to properly install all electricity connections and fuel lines.       Demonstrate ability to properly install all electricity connections and fuel lines.       Demonstrate ability to properly install all electricity connections and fuel lines.       Demonstrate ability to properly install all electricity connections and fuel lines.       Demonstrate ability to properly install all electricity connections and fuel lines.       Demonstrate ability to properly install all electricity connections and fuel lines.       Demonstrate ability to properly install all electricity connections and fuel lines.       Demonstrate ability to properly install all electricity connections and fuel lines.       Demonstrate ability to properly install all electricity connections and fuel lines.       Demonstrate ability to properly and the lines are of indicing.       Demonstrate ability to properly and the lines are of indicing.       Demonstrate ability to properly and the lines are of indicing.       Demonstrate ability to properly and the lines are of indicing.       Demonstrate ability to properly and the lines are of indicing.       Demonstrate ability to properly and the lines are of indicing.       Demonstrate ability to properly and the levely.       Demonstrate ability to	¹⁹ DL	09 Spot & Assemble Suitcases and lines	<ul> <li>Demonstrate ability to inspect and tighten all hammer seal unions between suitcases to</li> </ul>								1						
Demonstrate ability to properly earth ground equipment.     Demonstrate ability to properly earth ground equipment.     Demonstrate ability to properly earth ground equipment.     Demonstrate ability to properly earth ground equipment.     Demonstrate ability to properly install all electricity connections and fuel lines.     Peul Tank     Demonstrate ability to properly earth ground equipment and in line as per rig design.     Demonstrate ability to properly install all electricity connections and fuel lines.     Demonstrate ability to properly install all electricity connections and fuel lines.     Demonstrate ability to properly prover package & fuel tank level, in proper order and in line as per rig design.     Demonstrate ability to properly install all electricity connections and fuel lines.     Demonstrate ability to properly prover package & fuel tank level, in proper order and in line as per rig design.			prevent fluid or air leaks									ļ		0	<b>_</b>		
20       DL       10       Rig Up: Spot & Rig up Rig Power Package & Demonstrate ability to properly install all electricity connections and fuel lines.       0       0       0         20       DL       10       Rig Up: Spot & Rig up Rig Power Package & Demonstrate ability to properly install all electricity connections and fuel lines.       0       0       0       0         0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0			<ul> <li>Demonstrate ability to properly earth ground equipment.</li> </ul>	ļ							ļ	ļ		0			ļ
**     DL     10     Rig Up: Spot & Rig up Rig Power Package & Fuel Tank     •     Demonstrate ability to properly install all electricity connections and fuel lines.       •     Demonstrate ability to spot power package & fuel tank level, in proper order and in line as per circle dorigin.     •     •	20		<ul> <li>Demonstrate ability to spot suitcase level, in proper order and in line as per rig design.</li> </ul>						_		<u> </u>	Ļ		0	+		+
Fuel Jank                Demonstrate ability to spot power package & fuel tank level, in proper order and in line as per circle doriging.	20 DL	10 Rig Up: Spot & Rig up Rig Power Package &	<ul> <li>Demonstrate ability to properly install all electricity connections and fuel lines.</li> </ul>														
Demonstrate ability to spot power package & ruei tank level, in proper order and in line as     port drage data and the spot package are spot ability of the spot package are spot package and the spot package are spot package and the spot package are spot package are spot package are spot package are spot package are spot package are spot package are spot package are spot package are spot package are spot package are spot package are spot package are spot package are spot package are spot package are spot package are spot package are spot package are spot package are spot package are spot package are spot package are spot package are spot package are spot package are spot package are spot package are spot package are spot package are spot package are spot package are spot package are spot package are spot package are spot package are spot package are spot package are spot package are spot package are spot package are spot package are spot package are spot package are spot package are spot package are spot package are spot package are spot package are spot package are spot package are spot package are spot package are spot package are spot package are spot package are spot package are spot package are spot package are spot package are spot package are spot package are spot package are spot package are spot package are spot package are spot package are spot package are spot package are spot package are spot package are spot package are spot package are spot package are spot package are spot package are spot package are spot package are spot package are spot package are spot package are spot package are spot package are spot package are spot package are spot package are spot package are spot package are spot package are spot package are spot package are spot package are spot package are spot package are spot package are spot package are spot package are spot package are spot package are spot package are spot package are spot package are spot package are spot package are spot package are spot package are spot p		Fuel Tank							_			<u> </u>		0	+		+
			<ul> <li>Demonstrate ability to spot power package &amp; ruei tank level, in proper order and in line as por rig design.</li> </ul>														

#### Annex-12 : Competency Table: – Driller 3/20

Position:	Driller		Co	mpete	ncy leve	l require	d		Prof	iciency	Scale		GAP	Individ	ual Deve	lopmen	t Plan
				Rec	uired So	core			Ac	tual Sco	ore			1	_		
No Ref	Code Functional competency	Description of competency	Awarene	Applicati	Career	Advance	Expert	Aware	Applicati	i Career	Advance	Expert		1			
			SS	on	Proficien	d Level	Level	ess	on	Proficie	d Level	Level					
²¹ DL	11 Rig Up: Startup & Energize Rig Power	<ul> <li>Demonstrate the ability to start up generators and VFD/SCR systems.</li> </ul>											0				
22 DL	12 Rig Up: Assemble Rig Floor structural supports	<ul> <li>Demonstrate ability to install structual supports.</li> </ul>											0				
23 DL	13 Rig Up: Rotary system	<ul> <li>Demonstrate ability to rig up rotary and applicable drive system.</li> </ul>				ļ							0				
24 DL	14 Rig Up: HPU	<ul> <li>Desmonstrate the ability to rig up the HPU system.</li> </ul>			<u> </u>								0				
25 DL	15 Rig Up: Energize Draw Works & Driller Control	<ul> <li>Demonstrate ability to function test the Draw Works operations and emergency shut</li> </ul>															
		down.				1							0				ļ
36 81		Explain Draw Works & Drillers Console energizing procedures & requirements.		-	-			_		-			0	+	-+	+	Ļ –
20 DL	16 Rig Up: Pipe Handler Equipment	Demonstrate ability to correctly connect all hydraulic lines.							+				0	++		_	
27 DI	17 Dig Lipi Derrick/Mact Accombly	Explain the process for assembling derrick/mast, raising structure & equipment.			+					+			0	+-+	$\rightarrow$	+	<u> </u>
DL	17 Kig op. Derrick/Wast Assertibly	Demonstrate the ability to periorni the Pre-Raise Mast/Derrick to Pig Eleon									+		0				
		Demostrate the ability to string up lines & blocks in the mast/derrick		+	+	+			+		+		0				
		Desmonstrate the process for assembling derrick/mast_raising structure & equinment			1					+			0	++			
		<ul> <li>Ensure derrick ladders are in proper position &amp; stand pipe connected.</li> </ul>				1			+				0				
		Explain how to raise and secure Mast/Derrick to Rig Floor.			1								0				
		Explain the Pre-Raise Mast/Derrick Inspection.				1							0				
28 DL	18 Rig Up: Rig Floor	<ul> <li>Demonstrate the ability to install &amp; rig up winches and air tuggers.</li> </ul>				1					1		0				
		<ul> <li>Explain how to install &amp; rig up winches and air tuggers.</li> </ul>			T	1							0				
29 DL	20 Rig Up: Mud Tanks	Demonstrate the ability to Fill Mud Tanks, Check & Repair Leaks & Function Test All															
		Associated Equipment.											0				
		<ul> <li>Demonstrate the ability to install flow line &amp; associated equipment.</li> </ul>											0				
		<ul> <li>Demonstrate the ability to install mud mix equipment.</li> </ul>				ļ							0				ļ
		<ul> <li>Demonstrate the ability to install solids/gas control equipment.</li> </ul>							1				0				
³⁰ DL	22 Rig Up: Drill Water Systems	<ul> <li>Demonstrate the ability to Install Trip TanK &amp; Associated Equipment &amp; lines.</li> </ul>			ļ	ļ							0				ļ
		<ul> <li>Demonstrate the ability to set Reserve Water Tanks, Rig Water Tanks, Check &amp; Repair</li> </ul>											_				
		Leaks.								-			0	+			
31 DI	27 Big Down: Critical Stops	Demonstrate the ability to position choke manifold/gas seperator.									+		0	++	-+	-	
34 DL	27 Rig Down: Childai Steps	Demonstrate ability to ensure an equipment has been removed from location.		+	+	+				+	+			-			
		out											0				
32 DI	28 Rig Down: Fall Protection	Demonstrate ability to ensure anchor points are identified for crew lanvards.			1	1			1	-	+		0	+ +	$\rightarrow$	+	-
		<ul> <li>Explain pin removal and associated hazards.</li> </ul>			1	1			1	1			0	+	+	1	
		Explain procedures for working around the cellar/well head.											0				
33 DL	29 Rig Down: Inspection Process	Explain inspection process for drill line.			1				1	1			0				
		<ul> <li>Explain pre-move inspection process for ancillary equipment.</li> </ul>								1			0				
³⁴ DL	30 Rig Down: Transportation	<ul> <li>Demonstrate ability to ensure drill line is prepared for travel.</li> </ul>											0				
		<ul> <li>Demonstrate ability to separate and load out substructure.</li> </ul>				<u> </u>							0				<u> </u>
		<ul> <li>Explain how to secure all lines, piping and physical objects to prevent hazards during</li> </ul>															
		transporting.			ļ	ļ							0				ļ
25 51		Explain mat cleaning requirement prior to load out.				<u> </u>					_		0	++	<u> </u>	<b></b> _	L
35 DL	31 Rig Down: Environmental	Explain drilling fluid capture and transfer process.		+		<u> </u>							0				
26 DI	22 Plane in Stanner (Stanbard): Stanbing sig	Explain, if applicable, the process for oil-based mud (OBM) rig clean up and containment.						_	+		+		0	+	——	+	
30 DL	32 Place in Storage (Stacked): Stacking rig	<ul> <li>Demonstrate ability to ensure rig components are stored in an appropriate location and secured</li> </ul>											0				
		Secureu.							+		+		0	++			
		secured											0				
37 DI	33 Vertical/Conventional Drilling: Big Math Well	Demonstrate how to measure, strap. & caliper all tubulars.			1	1			1	1				+		+	<del>     </del>
50	Head and BOP Control Fourinment												0				
		<ul> <li>Demonstrate how to check drilling fluids characteristics and measurement.</li> </ul>			1	1				1			0	+		1	
		Demonstrate how to measure from Rotary Kelly Bushings to Well Head/Rotary Kelly				1			1								
		Bushings to all Blowout Preventor Rams and Annular.											0				
		<ul> <li>Demonstrate how to perform math calculations on pressure &amp; volume.</li> </ul>											0				
		<ul> <li>Explain the rig components and their limitations.</li> </ul>				1							0				

#### Annex-12 : Competency Table: – Driller 4/20

Position:	Driller		Cor	npeter	ncy leve	l required		Profi	ciency S	Scale		GAP	Individu	al Developn	nent Plan	
				uired So		Act	tual Sco	re								
No Ref	Code Functional competency	Description of competency	Awarene A	Applicati	Career	Advance Exper	t	Awaren	Applicati	Career	Advance E	xpert				
28			SS	on	Proficien	d Level Level		ess	on	Proficie	d Level	Level				
38 DL	34 Vertical/Conventional Drilling: Drawworks &	<ul> <li>Demonstrate how to operate drawworks and associated components.</li> </ul>											0			
	Associated Equipment	Evaluin the function of drawworks and all accordiated components (crown saving devices											0			
		<ul> <li>Explain the function of drawworks and an associated components (crown saving devices, brake systems &amp; coolant lines, guards, chains, spreckets, gear hoves, shut downs,</li> </ul>														
		hoisting/lowering limits per rig design)											0			
39 DI	35 Vertical/Conventional Drilling: Drawworks &	Demonstrate how to ensure that moving equipment does not interfere with other											Ŭ			_
	Associated Equipment	equipment/machinery - Simulataneous Operations.											0			
	Abbolacea Equipment	<ul> <li>Explain the importance of checking the equipment prior to use.</li> </ul>											0			
40 DI	36 Vertical/Conventional Drilling: Drawworks &	<ul> <li>Demonstrate how to follow the client's daily drilling plans.</li> </ul>											-			
	Associated Equipment												0			
		Demonstrate how to maintain an accurate pipe tally in relation to the well design.			1								0			
		Demonstrate how to make trips.			1								0			
		Demonstrate how to complete the daily tour sheet.											0			
41 DL	37 Vertical/Conventional Drilling:	Demonstrate how to ream at the correct RPM and GPM.														
	Drilling/Reaming												0			
DL	37 Vertical/Conventional Drilling:	Explain the importance to maintain complete records of all tools and tubular run into the														
	Drilling/Reaming	hole (including made-up lengths, tool-joints OD, ID, Serial numbers).											0			
42 DL	39 Vertical/Conventional Drilling: Pipe	<ul> <li>Demonstrate correct measuring points on all tubular, casings and tools.</li> </ul>														
	measurement, number and strapping of pipes									<u> </u>			0			
		<ul> <li>Explain how to correctly read a strapping tape.</li> </ul>			L					L	L		0			
		Explain how to properly number stands in derrick when TIH or POOH.											0			
43 DL	40 Vertical/Conventional Drilling: Stuck Pipe	<ul> <li>Demonstrate how to determine the drill string operating limits.</li> </ul>														
	Operation												0			
44 DL	41 Vertical/Conventional Drilling: Downhole	<ul> <li>Explain downhole problems and potential equipment failures.</li> </ul>														
	problems and equipment failure	-								ļ			0			
45 DL	42 Vertical/Conventional Drilling: Standpipe and	Demonstrate how to ensure all valves are in the "full open" or "closed" position.														
46	Bleed Off Line	Second and the second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second sec					_			<u> </u>	$\vdash$		0			
40 DL	44 Vertical/conventional Drilling: Tripping	<ul> <li>Demonstrate now to correctly monitor and record mud return and mill volumes while tripping in (out to recognize warping signs for well control issues)</li> </ul>											0			
		Explain afficient tripping speeds in open bale and when bit/ stab go through POPs											0			
		Explain encient tripping speeds in open note and when bit/ stab go tillough BOPs.     Explain how to monitor and record mud return and fill volumes while tripping in/out to											0			
		recognize warning signs for well control issues											0			
47 DI	47 Vertical/Conventional Drilling: Picking up	Demonstrate the ability to caliner and measure the BHA														
	drilling assembly												0			
	,	Demonstrate the method for strapping and counting the drill pipe.			1					1			0			
		Explain the importance and how to caliper and measure the BHA.			Í								0			
		Explain the method for strapping and counting the drill pipe.								1			0			
⁴⁸ DL	48 Vertical/Conventional Drilling: Trip in hole	Explain fluid displacement when TIH.														
	(TIH)				[								0			
		<ul> <li>Explain kick identification while TIH.</li> </ul>											0			
		<ul> <li>Explain the importance of recognizing bridging conditions.</li> </ul>											0			
		<ul> <li>Explain the importance of surge/swab hole conditions.</li> </ul>											0			
		<ul> <li>Explain the procedure if a kick is detected during TIH.</li> </ul>											0			
		Explain displacement as drilling assembly is pulled out of hole.			ļ				ļ	ļ	ļļ		0			
		<ul> <li>Explain kick identification while TOH.</li> </ul>			ļ					ļ	Ļ		0			
		<ul> <li>Explain procedure if a kick is detected during TOH.</li> </ul>			ļ				ļ	ļ	ļļ		0			
		<ul> <li>Demostrate how to maintain equivalent circulating density (ECD) during underbalanced</li> </ul>														
		drilling.			<b> </b>					<b> </b>			0	+		
		<ul> <li>Explain additional instrumentation used during underbalanced drilling.</li> </ul>			<u> </u>				<u> </u>	<u> </u>	┟		0			
		Explain pit volumes and flow characteristics.			ł					<b> </b>	<u>├</u>		U			
		<ul> <li>Explain the use or rotating control device (KCD).</li> <li>Evaluate the well control procedures and process during underbalance to the second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second seco</li></ul>				l							0	+		
		<ul> <li>Explain the well control procedures and process during underbalanced drilling.</li> </ul>				L			L	1	1 1		U	-		

#### Annex-12 : Competency Table: – Driller 5/20

<b>Position:</b>	Driller		Co	mpeter	ncy leve	l require	d		Pro	oficiency	Scale		GAP	Indivi	dual Deve	lopment Plan
				Req	uired So	ore			ł	Actual Sco	ore				_	
No Ref	Code Functional competency	Description of competency	<mark>Awarene</mark>	Applicati	Career	Advance	Expert	Av	aren Applic	ti Career	Advance	Expert				
49 DI	51 Well Controls Disor (Disenter / DOD / Due 8		SS	on	Proficien	d Level	Level		ess on	Proficie	d Level	Level				
49 DL	S1 Well Control: Riser/Diverter/ BOP (Run &	Demonstrate now to install new weinlead gaskets.											0			
	(tetreve)	Explain how to identify ring gaskets in relation to BOP flanges											0			
		Explain how to install new wellbead gaskets			1						1		0			+
		Explain the different phases of nippling up BOP and diverter based on hole section.			1						1		0			
50 DL	52 Well Control: Diverting	Explain how to pump either kill mud or water.											0			
	U U	<ul> <li>Explain the importance of operating the diverter.</li> </ul>									1		0			1
51 DL	53 Well Control: Management Well Control	Demonstrate function test of the BOP.														
	Systems												0			
		<ul> <li>Explain BOP components, their functions and their limitations.</li> </ul>			L								0			
		Explain the normal line up of BOP valves, Hydraulic chokes, Choke manifold and degasser														
		in accordance to the well program.								_			0			
52 DL	54 Well Control: Well Integrity And Well Control	<ul> <li>Demonstrate how to take SPR's, complete kill sheet and take accurate and correct SIDPP</li> </ul>														
		and SICP gauge readings.											0			
		<ul> <li>Explain how to take SPR's, complete kill sheet and take accurate and correct SIDPP and SICD serves readings</li> </ul>											0			
		SICP gauge readings.											0	-		
		Explain the different methods for shutting the well and the kining procedures.     Explan how to recognize influx and shut in well											0			
53 DI	55 Unconventional Drilling: Air Drilling	Explain now to recognize innux and shut in wen.     Explain instrumentation used during air drilling											0			
DL	55 Onconventional Drining. All Drining	Explain instrumentation used during an unning.     Explain rig up of low pressure air system into high pressure mud system											0			+
		<ul> <li>Explain the differences between mud drilling and air drilling.</li> </ul>											0			1
		<ul> <li>Explain the function of blooie line and how to secure.</li> </ul>											0			
		<ul> <li>Explain the importance of an igniter at the end of a blooie line.</li> </ul>											0			1
		Explain the pressure differential between input air and return air.											0			
		<ul> <li>Explain the use of rotating control device (RCD).</li> </ul>											0			
		<ul> <li>Explain well operations parameters and procedures for air drilling and the conditions that</li> </ul>														
		may require changes.											0			
54 DL	56 Unconventional Drilling: Coring	<ul> <li>Explain pick up and lay down procedures of the core barrel.</li> </ul>											0			
		<ul> <li>Explain the differences between conventional coring and sidewall coring.</li> </ul>									ļ		0			
		<ul> <li>Explain the hazards when retrieving cores.</li> </ul>											0			
		Explain the relationship of the outer and inner barrels for coring.											0	_		
55 DL	57 Directional Drilling: Mechanical Survey Tools	Explain the application for Teledrift type drift indicators.											0			
56 DI	50 Disertional Drilling: Magnetic Convey Table	Explain the application for 1 otco type drift indicators.								_			0			
JU DL	58 Directional Drilling: Magnetic Survey Tools	Explain the application for Multi-shot film.     Explain the application for Cincle shot film.											0			
57 DI	59 Directional Drilling: Gyroscopic Suprey Tools	Explain the application for Single Shot finit.     Explain how information travels from the MWD to the surface to the computer system	-										0			+
DL	55 Directional Drining. Gyroscopic Survey roois	Explain now information travers non-the wind to the surface to the computer system.     Explain the application for Electronic single and multi-shot instruments			+								0			
		<ul> <li>Explain the application for Magnetic and gyroscopic MWD surveys.</li> </ul>											0			+
		<ul> <li>Explain the application for Multi-shot.</li> </ul>											0			+
		<ul> <li>Explain the application for Single shot.</li> </ul>			1						1		0			1
		Explain the MWD components.			1								0			1
		Explain the purpose and positioning of Non-magnetic drill collars and the BHA.											0			
58 DL	60 Directional Drilling: Wellbore Surveying and	Demonstrate ability to solve problems associated with running a survey.														
	Record Keeping				ļ	ļļ		L			ļ		0			
		Demonstrate application of the above.									ļ		0	_		
		<ul> <li>Demonstrate how to run a survey.</li> </ul>											0			
		<ul> <li>Differentiate when survey data may be considered valid or invalid.</li> </ul>				ļļ							0			
		<ul> <li>Explain general practices to take to prevent survey data discrepencies.</li> </ul>			+	<u> </u>					<u> </u>		0			
		Explain problems associated with survey data.						├					0			
		<ul> <li>Explain the application for elements of a directional survey.</li> <li>Evaluate the concents dealers and how dealers accurate affects the well-base</li> </ul>											0			
		<ul> <li>Explain the concepts dogleg and now dogleg severity affects the wellbore.</li> </ul>			1								U			

#### Annex-12 : Competency Table: – Driller 6/20

Position:	Driller		C	ompete	ency leve	l require	d		Prof	iciency S	cale		GAP	Individua	al Develo	pment Plar
				Re	quired S	ore			Ac	tual Sco	re					
No Ref	Code Functional competency	Description of competency	Awarene	Applicat	ti Career	Advance	Expert	Awaren	Applicati	Career	Advance Ex	pert				
		· · · ·	SS	on	Proficien	d Level	Level	ess	on	Proficie	d Level Lo	evel			<u> </u>	
59 DL	61 Directional Drilling: Directional Plots and	Drilling Parameters & Directional Drilling: Explain hydraulics with and without downhole														
	Drilling Parameters	motors.											0			
		Drilling Parameters & Directional Drilling: Explain mechanical limitations of downhole														
		motors.											0			
		Drilling Parameters & Directional Drilling: Explain rotary speed limitations.											0			
		considerations.											0			
		Drilling Parameters & Directional Drilling: Explain weight on bit (WOB) considerations.											0			
		Elements of the Directional Plot: Explain the intent/importance of plot details.											0			
		<ul> <li>Elements of the Directional Plot: Explain the plan view.</li> </ul>											0			
		<ul> <li>Elements of the Directional Plot: Explain vertical section view.</li> </ul>											0			
		<ul> <li>Elements of the Directional Plot: Explain wellpath and site legend details.</li> </ul>											0			
⁶⁰ DL	62 Directional Drilling: Motor Theory and	<ul> <li>Explain chemical and fluid slide enhancement.</li> </ul>														
	Operations												0			
		Explain factors affecting slideability.											0			ļ
		Explain how a PDM (positive displacement motor) works and major mechanical														
		assemblies.				ļ							0			
		Explain micro doglegs and ledging when drilling with motors.											0			
		Explain motor operating procedures and parameters.											0			
		Explain reactive torque such as hole conditions and drill string design.											0			
		Explain stabilizer use and effect on build rates.											0			
61 DI	C2 Discriticant Drilling: Units Character and	Identify & Explain bearing and housing types.		-	-			_					0		+	$\vdash$
01 DL	63 Directional Drilling: Hole Cleaning and	Explain clean up cycles.											0			
	Cuttings transport in Honzontal Weis	Evolain belical cuttings path hole cleaning model in borizontal wells											0			
		Explain less (low gravity solids) and solids control considerations											0	-		
62 DI	66 Hoisting/Rig Floor: Derrick Climbing Systems	Demonstrate how to use equipment associated with personnel climbing systems (rig											Ŭ		+	
	oo nobting/ng noon bernek ennong systems	specific).											0			
		Explain how to inspect equipment associated with personnel climbing systems.											0	-		
63 DL	70 Hoisting/Rig Floor: Manriding Winches & Belts	Demonstrate correct hand signals associated with operating manriding winch.		1									0		+	
		Demonstrate how to inspect manriding winch.											0			
		Demonstrate how to inspect, wear & fasten manriding belt.											0			
		Demonstrate correct hand signals associated with operating utility winch.											0			
		Demonstrate how to safely operate and maintain utility winch.											0			
⁶⁴ DL	72 Power Systems: Engine instrumentation	Explain the purpose of engine instrumentation.											0			
65 DL	73 Power Systems: Engine report and log book	Demostrate how to record engine gauge readings and maintain logs.											0			
		Explain the purpose of record keeping.											0			
66 DL	74 Power Systems: Engine fluids	Demonstrate how to check engines fluids levels and add as required.											0			
		<ul> <li>Explain types of engine fluids and level requirements.</li> </ul>											0			
67 DL	75 Power Systems: Engine fuel system	Demonstrate how to ensure pressure, filtation and line requirements will sustain engine														
		operation.				ļ							0			ļ
		<ul> <li>Explain pressures, filtration, and line inspection.</li> </ul>											0			
⁶⁸ DL	76 Power Systems: Engine cooling system	Explain how to check engine coolant level.				ļ				ļ			0			L
		Explain radiator and cooling fan inspection.		<u> </u>	_			_	ļ				0		<u> </u>	$\vdash$
69 DL	77 Power Systems: Engine air intake systems	Demonstate how to change air filters.				ļ			ļ	ļ			0			L
		Explain how to inspect air filters and intake differential pressures.	<u> </u>										0			$\vdash$
70 DL	78 Circulating Systems: Low Pressure Mud System	Demonstrate valve alignment to transfer mud and mix chemicals in each pit.											0			
		Explain the layout of the pits including valve locations.											0		+	

#### Annex-12 : Competency Table: – Driller 7/20

Posit	tion:	Driller		Co	ompete	ncy leve	l require	d		Pro	ficiency Scale		GAP	Individual Development Plan
					Rec	quired So	core			A	ctual Score			
No	Ref	Code Functional competency	Description of competency	Awarene	Applicat	i Career	Advance	Expert	Awaren	Applicat	ti Career Advance	Expert		
				SS	on	Proficien	d Level	Level	ess	on	Proficie d Level	Level		
71	DL	79 Circulating Systems: High Pressure Mud	<ul> <li>Demonstrate how to change out expendables.</li> </ul>				1							
		System											0	
			Demonstrate how to isolate the valves.										0	
			Demonstrate how to monitor mud pumps during operating.										0	
			<ul> <li>Explain how to change out expendables.</li> </ul>										0	
			<ul> <li>Explain the purpose and operation of mud pumps.</li> </ul>										0	
			<ul> <li>Identify where valves are located.</li> </ul>										0	
72	DL	80 Circulating Systems: Pulsation Dampener/Bladder	Demonstrate how to perform maintenance of a pulsation dampener.										0	
			Explain the operation and maintenance of a pulsation dampener.		1								0	
			Explain the purpose of a pulsation dampener.		1		1						0	
73	DL	81 Circulating Systems: Shale shakers	Demnostrate shale shaker maintenance.										0	
		0,	Demonstrate how to adjust shaker screens.				1						0	
			Demonstrate how to change shaker screens.				1						0	
			Explain how to adjust shaker screens.		1		1						0	
			<ul> <li>Explain how to change shaker screens.</li> </ul>				1						0	
			Explain shale shaker maintenance.		1								0	
			Explain the purpose of a shale shaker.							1			0	
74	DL	82 Circulating Systems: Trip Tanks	Demonstrate how to line up trip tank valves for filling or monitoring the hole.										0	
			Explain how to line up trip tank valves for filling or monitoring the hole.										0	
			<ul> <li>Explain the purpose of the trip tank.</li> </ul>										0	
75	DL	83 Circulating Systems: Mud Saver Bucket	Demonstrate how to perform maintenance on the mud saver bucket.										0	
			Demonstrate how to use the mud saver bucket.										0	
			<ul> <li>Explain the purpose of a mud saver bucket.</li> </ul>										0	
			Explain when to use the mud saver bucket.										0	
76	DL	84 Rotating System: Master Bushings	Demonstrate how to identify wear of the master bushings.										0	
			<ul> <li>Demonstrate how to perform maintenance of the master bushings.</li> </ul>										0	
			<ul> <li>Demonstrate how to pull and set master bushings.</li> </ul>										0	
			<ul> <li>Explain how to identify wear of the master bushings.</li> </ul>										0	
			<ul> <li>Explain how to perform maintenance of the master bushings.</li> </ul>										0	
			<ul> <li>Explain the purpose of the master bushings.</li> </ul>										0	
77	DL	85 Rotating System: Rotary Table	<ul> <li>Demonstrate the maintenance procedures for the rotary table.</li> </ul>										0	
			<ul> <li>Demonstrate the procedure for locking and working around.</li> </ul>										0	
			<ul> <li>Explain the maintenance procedures for the rotary table.</li> </ul>										0	
			<ul> <li>Explain the procedure for locking and working around.</li> </ul>										0	
			<ul> <li>Explain the purpose of the rotary table.</li> </ul>										0	
78	DL	86 Well Control Equipment: BOP Handling	<ul> <li>Demonstrate proper sling application and attachment methods between lifting device and</li> </ul>										1 T	
		Systems	BOP equipment.		1							ļ	0	
			<ul> <li>Explain JSA / Work Plan knowledge for each critical step.</li> </ul>				ļ						0	
			<ul> <li>Explain proper application and use of BOP handling systems.</li> </ul>		1								0	

#### Annex-12 : Competency Table: – Driller 8/20

Position:	Driller		Co	ompete	ncy leve	l require	d		Prof	iciency S	Scale	GAP	Individ	ual Develo	pment Plan
			Required Score           Awarene Applicati         Career         Advance         Expert           Score         Opplicati         Career         Advance         Expert							tual Sco	re				
No Ref	Code Functional competency	Description of competency	Awarene	Applicat	i Career	Advance	Expert	Aware	n Applicati	i Career	Advance Exper	t			
20			SS	on	Proficien	d Level	Level	ess	on	Proficie	d Level Level		_		r 1
79 DL	87 Well Control Equipment: BOP Control System	<ul> <li>Demonstrate how to connect the HCR valve, manual valve, cotlex hose, for BOP and choke</li> </ul>													
	And Accumulator	manifold.			+					++		0			
		Demonstrate how to connect the kill line and check valve as designed.								++		0			
		Demonstrate how to indentify that BOPE hydraulic lines meet OEM requirements and are							+						
		<ul> <li>Demonstrate now to indentify that BOPE injuration mest need optimized internets and are connected and protected to ensure BOPE function as designed.</li> </ul>										0			
		<ul> <li>Demonstrate how to install the Driller's and remote BOP control panels and function test</li> </ul>													
		same.										0			
		• Demonstrate that all valves and gauges are in good working condition and clearly marked			1				1						
		as to their function.										0			
		Demonstrate that resevoir is filled to proper fluid level with proper fluid.										0			
		<ul> <li>Demonstrate that the accumulator unit has the proper fluid volume capacity for the BOP</li> </ul>													
		application to which it is being connected.								ļ		0			
		Demonstrate that the BOP Control system and accumulator unit has the proper working													
		pressure rating for the BOP equipment to be installed.										0			
		<ul> <li>Explain accumulator unit fluid volume capacity as related to the BOP equipment to be</li> </ul>													
		installed.										0			
		<ul> <li>Explain BOP control system and accumulator unit working pressure rating as related to the BOB equipment to be installed.</li> </ul>										0			
		Evolution how to connect the HCP valve, manual valve, coflex hose, for ROP and choke							+						
		manifold										0			
		<ul> <li>Explain how to function test all BOP elements.</li> </ul>								1		0			
		<ul> <li>Explain how to install the Driller's and remote BOP control panels and function test same.</li> </ul>							1			0			
		<ul> <li>Explain the designed arrangement foor kill line and check valve.</li> </ul>								1		0			
		<ul> <li>Explain the importance of the condition of valves and gauges and their identification.</li> </ul>		1	1				1	1		0			
		<ul> <li>Explain the requirements for BOPE hydraulic lines.</li> </ul>										0			
⁸⁰ DL	88 Well Control Equipment: BOP Preventers &	<ul> <li>Demonstrate how to install bolt completely into the nut.</li> </ul>													
	Fail Safe Valves			ļ						ļ		0			
		<ul> <li>Demonstrate how to select and install the appropriate ring gaskets in all connections.</li> </ul>										0			
		<ul> <li>Demonstrate proper torque sequence to insure flange gap is even on all sides.</li> </ul>		ļ								0	_		
		<ul> <li>Demonstrate that all BOP components have been inspected and certified in accordance with OFM exercifications.</li> </ul>													
		With DEM specifications.			+							0			
		<ul> <li>Explain how to guide upper BOP sections onto lower sections.</li> <li>Explain how to open the BOP doors and change nine rams and blind rams</li> </ul>								++		0			
		Explain OEM specifications and certification for BOP components								++		0			
		<ul> <li>Explain term specifications and certification for bor components.</li> <li>Explain the importance of always using new and appropriate ring gaskets in all</li> </ul>							-						
		connections.										0			
		<ul> <li>Explain the importance of having the proper flange gap on all sides.</li> </ul>								1		0			
		<ul> <li>Explain the importance of why all bolts need to be engaged comletely into the nut.</li> </ul>										0			
		<ul> <li>Explain the proper assembly (stack-out) of all BOP components to be used per drilling</li> </ul>													
		program.										0			
⁸¹ DL	89 Well Control Equipment: BOP Testing	Demonstrate how to connect the test lines and secure from test unit to BOP.										0			
	Equipment	Demonstrate how to open the BOP doors and change rams.		<u> </u>					+			0			
		<ul> <li>Demonstrate that hydraulic lines are of proper pressure rating.</li> </ul>							+	1		0 0			
		Demonstrate that the test unit is of adquate pressure rating to test the BOP.							1			0			
		Explain how to connect the test lines and secure from test unit to BOP.							1			0			
		<ul> <li>Explain how to open the BOP doors and change rams.</li> </ul>										0			
		<ul> <li>Explain test unit pressure requirements in relation to BOP testing.</li> </ul>										0			
		<ul> <li>Explain the requirements for BOPE hydraulic lines.</li> </ul>										0			

# Annex-12 : Competency Table: – Driller 9/20

Pos	tion:	Driller			Competer	ncy leve	l require	d		Profi	iciency s	Scale		GAP	Indiv	dual De	velopm	ent Plan
					Req	uired So	ore			Act	tual Sco	ore						
No	Ref	Code Functional competency	Description of competency	Awa	rene Applicati	Career	Advance	Expert	Awaren	Applicati	Career	Advance	Expert					
82	DL	90 Well Control Equipment: Full Opening Safety Valve, Kelly cock valve, IBOP	• Explain each tool, their function, storage position and location of each.			- TOTAL	u Level	Level		0.1	Troneic	u cerei		0				
			<ul> <li>Explain the importance all wrenches for each safety valve are kept orderly and are readily available.</li> </ul>											0				
			<ul> <li>Explain the importance of inspecting valve connections in accordance with drill string requirements.</li> </ul>											0				
83	DL	91 Well Control Equipment: Float Valve	Demonstrate how to visually inspect float valves for damage.											0				
			<ul> <li>Demonstrate the installation of float valve in drill string.</li> </ul>			<u> </u>								0		h		
			Explain now to visually inspect float valves for damage.     Explain the installation of float valve in drill string.		_									0		<u>├</u> ──┼		_
84	DI	92 Well Control Equipment: Diverter	Explain the installation of hoat valve in drift string.     Demonstrate the ability to configuration all components in diverter system including flow		_									0	_	<u> </u>		_
	01	32 Weil control Equipment. Diverter	lines, valves, and sizing for the application per the drilling program.											0				
			<ul> <li>Explain the configuration of all components in diverter system including flow lines, valves.</li> </ul>			1												
			and sizing for the application per the drilling program.											0				
			<ul> <li>Explain the purpose of a diverter system as opposed to a BOP.</li> </ul>											0		(		
			Demonstrate sizing and pressure rating of spools for wellhead and BOP equipment meet															
			requirements of drilling program.			ļ				ļ				0		ł		
			<ul> <li>Demonstrate that flow lines are routed and secured at a location and distance to allow for floring and (an florid containment)</li> </ul>											0				
			Taring and/or fluid containment.											0				
			<ul> <li>Explain now mes routing and ancroning for name and/or noise containment.</li> <li>Explain sizing and pressure rating of spools for wellhead and BOP equipment per drilling</li> </ul>															
			program.											0				
85	DL	94 Well Control:Testing BOP: Pressure And	Demonstrate how to ensure tool joint space out within the BOP are adequate and a vent															
		Function Testing Of BOPs	open below the wellhead test plug is open.			ļ								0		ļļ.		
			<ul> <li>Demonstrate that appropriate ring gaskets are used for each flange.</li> </ul>											0				
			<ul> <li>Demonstrate the test sequence of valves and BOP's including identifying leaks and how to correct them</li> </ul>											0				
			Explain how to identify ring gaskets in relation to BOP flanges											0		l		
			<ul> <li>Explain the test sequence of valves and BOP's including identifying leaks and how to</li> </ul>												~~~~~~			
			correct them.											0				
			Explain tool joint placement (space out) within the BOP and the purpose of venting below															
			the test plug.							ļ				0		$\vdash$		
86	DL	95 Well Control:Testing BOP: Pressure And	<ul> <li>Demonstrate how to function the valves to their fully open and closed positions and align for detiling according.</li> </ul>											0				
		Function Testing Of BOPS Choke Manifold	Tor drilling operations.											0		t		
			<ul> <li>Demonstrate how to test to rated pressures and durations and how to bleed off test</li> </ul>			1												
			pressure after test.											0				
			<ul> <li>Explain how to test to rated pressures and durations and how to bleed off test pressure</li> </ul>															
			after test.			Ļ				ļ		ļļ		0		ļ		
			<ul> <li>Explain how to function the valves to their fully open and closed positions and align for defilies according.</li> </ul>											0				
			arilling operations.			<u> </u>								0		h		
87	DI	96 Well Control:Testing BOP: Pressure And	<ul> <li>Demonstrate how to function the valves to their fully open and closed positions and align</li> </ul>											0				_
	52	Function Testing Of BOPs Kill and Chokeline Valves	for drilling operations.											0				
			Demonstrate how to lubricate valves with the high pressure grease.			Ļ					L	L		0		Ļ		
			<ul> <li>Demonstrate how to test to rated pressures and durations and how to bleed off test</li> </ul>						1									
			pressure arter test.											U				
			<ul> <li>Explain now to test to rated pressures and durations and now to bleed off test pressure after test.</li> </ul>			1			1					0				
			<ul> <li>Explain how to function the valves to their fully open and closed positions and align for drilling operations</li> </ul>															
			Explain how to lubricate valves with the high pressure grease											0				
L			Explain new to idditidate valves with the high pressure grease.	L	1	{	L – L		- 1	1	1			U	_	<u> </u>		

# Annex-12 : Competency Table: – Driller 10/20

Pos	ition:	Driller		C	ompete	ncy leve	l require	d		Profi	ciency S	Scale	GAP	Individual Development Plan
					Rec	uired So	ore			Act	ual Sco	re		
N	o Ref	f Code Functional competency	Description of competency	Awarene	Applicati	Career	Advance	Expert	Awaren	Applicati	Career	Advance Expert		
				SS	on	Proficien	d Level	Level	ess	on	Proficie	d Level Level		
88	DL	97 Well Control:Testing BOP: Pressure And	Demonstrate how to function the valves to their fully open and closed positions and align											
		Function Testing Of BOPs Pressure Test	for drilling operations.											
		Standpipe manifold	Demonstrate have to behaviority unless										0	
			<ul> <li>Demonstrate how to lubicate valves.</li> <li>Demonstrate how to test to rated processes and durations and how to blood off test</li> </ul>										0	
			Demonstrate now to test to rated pressures and durations and now to bleed on test pressure after test										0	
			Explain how to test to rated pressures and durations and how to bleed off test pressure			+								
			after test										0	
			Explain how to function the valves to their fully open and closed positions and align for		1	1								
			drilling operations.										0	
			<ul> <li>Explain how to lubricate valves.</li> </ul>		1								0	
89	DL	103 Diesel pumps	Demonstrate the use and maintenance of diesel pumps.										0	
			<ul> <li>Explain the the importance of rig fuel filtering system.</li> </ul>										0	
			<ul> <li>Explain the use and maintenance of diesel pumps.</li> </ul>										0	
90	DL	104 Closed loop mud equipment	<ul> <li>Explain when the different types of closed loop mud cleaning equipment are used.</li> </ul>										0	
91	DL	105 Centrifugal pumps	<ul> <li>Demonstrate how to prime and maintain a centrifugal pump.</li> </ul>										0	
			<ul> <li>Explain how to prime and maintain a centrifugal pump.</li> </ul>										0	
92	DL	106 Diaphram pumps	<ul> <li>Demonstrate how to prime and maintain a diaphram pump.</li> </ul>		ļ								0	
			Explain how to prime and maintain a diaphram pump.						_				0	
93	DL	107 Valve types	<ul> <li>Demonstrate how to operate low pressure and high pressure valves.</li> </ul>										0	
			<ul> <li>Explain the different types of valves used in mud systems and where each type is</li> </ul>											
		400 Deles - 1 -1	applicable.						_				0	
94	DL	108 Rotary swivel	Explain what a rotary swivel is and when it is used.						_				0	
	DL	112 Tubulars: Tubular care and maintenance	<ul> <li>Demonstrate how to store and transport tubulars.</li> <li>Demonstrate how to clean and increast connections during drilling and tripping operations.</li> </ul>										0	
			<ul> <li>Demonstrate now to clean and inspect connections during drining and tripping operations.</li> <li>Evaluate how the slips and rotany bushing relate to the care of tubulars.</li> </ul>										0	
			Explain how to break in new tool joints										0	
			<ul> <li>Explain how to clean and inspect connections during drilling and tripping operations.</li> </ul>		1	1							0	
			<ul> <li>Explain the different types of mechanical surface imperfections that should be monitored</li> </ul>										-	
			or prevented that could lead to failures.										0	
			<ul> <li>Explain the importance of breaking in new tool joints.</li> </ul>										0	
			<ul> <li>Explain the importance of cleaning and inspection of tubular connections.</li> </ul>										0	
			<ul> <li>Explain the procedures for storing and transporting tubulars.</li> </ul>										0	
			Explain why thread compound is used.										0	
96	DL	114 Tubulars: Make Up/ Break Out of Drilling Bits	<ul> <li>Demonstrate how to apply the required torque for different thread connections on all</li> </ul>											
			tubular, subs and drill bits.		ļ								0	
			<ul> <li>Explain torque requirements for different thread connections on all tubular, subs and drill</li> </ul>											
07	DI	115 Completions: Colled Tubics (CT)	Dits.						_				0	
57	DL	115 Completions: Colled Tubing (CT)	<ul> <li>Explain the importance of ensuring why all surface equipment (BOP, coll tubing lines, etc.)</li> </ul>										0	
			<ul> <li>Explain the possible consequence of coil tubing failure (bursts, whiplash, etc.)</li> </ul>										0	
98	ח	116 Completions: Completions string	Explain the possible consequence of con rabing landle (bursts), whipiash, etc.).      Demonstrate how to ensure tubing hanger lands appropriately on wellbead						_				0	
	DL	110 completions. completions string	Demonstrate the correct running order of completion tubulars and correct space-out with											
			seal assembly.										0	
			Explain the correct running order of completion tubulars and correct space-out with seal		1	1				<b> </b>				
			assembly.										0	
			<ul> <li>Explain the differences between handling tubing vs. drill pipe.</li> </ul>		1	1							0	
99	DL	118 Fishing Equipment	Demonstrate the ability to PU BHA assembly of fishing tools and run in hole.										0	
			<ul> <li>Demostrate how to POOH with fish engaged.</li> </ul>			ļ							0	
			<ul> <li>Explain BHA assembly of fishing tools and knowledge of down-hole operations.</li> </ul>		ļ	ļ							0	
			<ul> <li>Explain the procedure and precautions when POOH with fish.</li> </ul>		1								0	

# Annex-12 : Competency Table: – Driller 11/20

Position:	Driller		Co	ompete	ncy leve	l require	d		Prof	iciency S	Scale		GAP	Individ	ual Deve	opmen	it Plan
				Rec	uired So	core			Ac	tual Sco	re						_
No Ref	Code Functional competency	Description of competency	Awarene	Applicat	Career	Advance	Expert	Awaren	Applicati	Career	Advance	Expert		-			
			ss	on	Proficien	d Level	Level	ess	on	Proficie	d Level	Level				L	<u> </u>
100 DL	119 Forklift Operations	Demonstrate how to operate forklift.			Ļ								0				ļ
		Demonstrate the ability to perform rigging and determine lifting capacities for forklift.			ļ						-		0				ļ
		Demonstrate the inspection and general maintenance procedure for a forklift.			ļ								0				
		Explain how to operate forklift.		ļ									0				ļ
		Explain rigging and lift capacities for forklift.		ļ	ļ								0				
		Explain the inspection and general maintenance of forklift.		<u> </u>	ļ			_					0			+	<u> </u>
101 DL	120 Cementing	<ul> <li>Calculate strokes required to bump the cement plug while displacing with rig pump.</li> </ul>											0				
		<ul> <li>Explain the charactistics and importance of a proper cement job.</li> </ul>		ļ									0	_			
		Monitor returns to surface and distinguish the difference between cement and drilling														1	
													0				
102 DI	121. Other Occurtings, Dive & Alternation Mail	Rig-up cementing lines and line up valves/ transfer mud to cementing unit.	-		<u> </u>			_					0	+		+	<u> </u>
102 DL	121 Other Operations: Plug & Abandon Well	Demonstrate how to rollow the plug and abandon program.											0				
		Demonstrate now to perform pressure testing after plug has cured.											0				
		Eveloin how to perform proceure testing after plug has sured															
		Explain now to perform pressure testing after plug has cured.			<u> </u>								0				
		Explain the plug and abandon program.											0				
103 DI	122 Other Operations: Drillstom Test	Explain tripping procedure after centent plug is set in place.						_					0	++	+	+	<u> </u>
105 DL	122 Other Operations: Dhilsteni Test	Demonstrate how to make up and torgue components of the drill store test assembly											0				
		Demonstrate now to make up and torque components of the drift stein test assembly.							+				0				
		Evaluation how to make up and torque components of the drill stom test ascombly			<u> </u>								0				
		Explain now to make up and torque components of the drin stem test assembly.							+				0				
		Explain sale tripping spectas and procedures in cased and open noic.							+				0				
104 DI	123 Other Operations: Conductor and Casings	Demonstrate how to determine the back-up tong line is sized and installed correctly											0	-		+	<u> </u>
	125 Other operations, conductor and casings	Demonstrate how to identify cross-threaded pipe.			1								0				
		Demonstrate how to stab casing.											0	-		++	
		Demonstrate visual inspection of casing threads for damage and cleanliness.											0			1	
		Explain how to determine the back-up tong line is sized and installed correctly.		1					1				0			+	
		<ul> <li>Explain how to identify cross-threaded pipe.</li> </ul>											0	_			
		<ul> <li>Explain how to stab casing.</li> </ul>											0			1	
		<ul> <li>Explain visual inspection of casing threads for damage and cleanliness.</li> </ul>											0	-			
¹⁰⁴ DL	124 Other Operations: Casing Stabbing Board	<ul> <li>Demonstrate how to rig up and postition stabbing board.</li> </ul>											0				
		<ul> <li>Explain how to rig up and postition stabbing board.</li> </ul>											0				
¹⁰⁵ DL	125 Other Operations: Logging	<ul> <li>Demonstate how to rig up the wireline sheaves, (in mast and V-door).</li> </ul>											0				
		<ul> <li>Demonstrate how to monitor well conditions during logging operation.</li> </ul>			<u> </u>								0				
		<ul> <li>Demonstrate how to rig up packoff/lubricator assembly.</li> </ul>		L					ļ				0				
		<ul> <li>Explain how to monitor well conditions during logging operation.</li> </ul>			ļ				ļ				0				ļ
		<ul> <li>Explain how to rig up the wireline sheaves, (in mast and V-door).</li> </ul>											0	_			ļ
		<ul> <li>Explain the procedure for rigging up packoff assembly.</li> </ul>		ļ					ļ				0	_			ļ
		<ul> <li>Explain well control shut in during wireline logging depending on type and length of</li> </ul>															
		packoff/lubricator assembly being used.	_										0			+	<u> </u>
106 DL	126 Other Operations: Mud Characteristics	<ul> <li>Demonstrate how to maintain correct mud properties mixing chemicals to mud as</li> </ul>															
		instructed by mud engineer.											0				
		Demonstrate how to manage aerated or if it is gas-cut mud.		ļ									0				
		Demonstrate now to monitor solids control equipment.											0				
		Demonstrate how to record mud weight, viscosity, and volumes.		<u> </u>									0			+	
		Explain how to identify if mud is parated or if it is gas out		<u> </u>					+				0	++-		+	
		Explain now to record mud weight viscosity and volumes						-			$\vdash$		0			+	
		Explain new to record mud weight, viscosity, did volumes.							+							+	
		Explain new to dataze the difference solus control equipment for mud fill dioli.			1				+				0				
		Explain the object circlinic integration integration.							+				0			+-+	
		Explain the importance of communicating mud properties and all fluid changes to rig			1				+		+					+	<u> </u>
		<ul> <li>explain the importance of communicating mud properties and an indid changes to fig nersonnel</li> </ul>											0				1
		personnei.	1	1	i	- 1			1	1 1	1		U				1

# Annex-12 : Competency Table: – Driller 12/20

Posi	tion:	Driller		Co	mpeter	ncy leve	l require	d		Profi	iciency S	cale		GAP	Individ	lual Dev	elopme	nt Plan
					Req	uired So	core			Act	tual Scor	e						
No	Ref	Code Functional competency	Description of competency	Awarene	Applicati	Career	Advance	Expert	Awaren	Applicati	Career A	Advance	Expert					
107	DL	127 Other Operations: Mud Transfer	Demonstrate how to line up valves, hoses and hard piping for the mud system transfers.	33	011	FIONCIEN	u Levei	Level	635		FIONCIE	u Levei	Level	0	<b>-</b>			<b>—</b>
			<ul> <li>Demonstrate how to notify personnel of transfers, monitor mud volume sensors and re-</li> </ul>			1												1
			set once completed.											0				
			<ul> <li>Explain the importance of communicating fluid transfers and resetting PVT system.</li> </ul>			1								0	-			
			Explain the process for mud system transfers.											0				1
108	DL	128 Other Operations: Drill Water System	Demonstate how to maintain adequate drill water.											0				1
			<ul> <li>Explain the importance of maintaining adequate water volume for drilling operations.</li> </ul>			1	1				f			0				1
109	QHSE	01 Induction (Post-Hire Corporate and Unit	Demonstrate immediate response during coordinated drills (Including your assigned							(								1
		Specific)	Muster Station(s) and location of your Lifeboat(s) (if applicable).											0				
		- F	Explain assigned roles and responsibilities according to the Emergency Response Plans or												-			
			Station Bill.											0				
			Explain the general duties of the Unit/Crew specific positions.											0				
			Explain your company's position in regard to compliance with regulatory requirements															
			(for applicable position).											0				
			<ul> <li>Explain your Company's specific Short Service Employee program (if applicable).</li> </ul>											0				
			Identify and explain the various components of the Rig or Unit.											0				
			Provide evidence of completion of the Corporate and Unit Specific Induction/Orientation															
			course.											0				
110	QHSE	02 International Safety Management Code (ISM)	<ul> <li>Demonstrate where you will find onboard reference resources for the ISM Code.</li> </ul>															1
		- If applicable												0				
			Explain (in brief) the elements of the ISM code and their importance to ensure safe			1												
			management and operation of ships and for pollution prevention.											0				
			<ul> <li>Explain the significance of ISM code and to which vessels it applies.</li> </ul>											0				
			Explain who is the DPA, his functions and importance thereof.											0				
111	QHSE	03 International Ship and Port Facility Security	<ul> <li>Explain the applicable local and flag state security requirements.</li> </ul>															
		Code (ISPS)												0				
			• Explain the ISPS security levels and the significance of each including expected response to															
			it.											0				
			<ul> <li>Explain the significance of the ISPS code.</li> </ul>			l								0				
			<ul> <li>Identify who the SSO is and briefly explain the SSO's function onboard.</li> </ul>											0				
			Provide evidence of completion of the onboard ISPS course.			Į								0				
			Provide evidence that the security assessment has been carried out and where it is															
			maintained.											0				
112	QHSE	04 Quality, Health, Safety, Environment and	Describe your role and responsibilities in order to comply with company's QHSES policies.															
		Security (QHSES) Policy									ļļ.			0				
			<ul> <li>Explain good housekeeping practices and personal hygiene practices in accordance with</li> </ul>															
			company policies.											0				
			<ul> <li>Explain the company's QHSES policies (as applicable).</li> </ul>			ļ								0				_
			<ul> <li>Explain the objectives and the importance of active participation in the various meetings</li> </ul>															
			held onsite/onboard (Induction meeting, Pre-shift meeting, Weekly safety meeting, Risk															
			Assessment/Pre-job meeting).			<b>.</b>				ļ	ļļ.			0				
			<ul> <li>Identify where you would find the company QHSES Policies.</li> </ul>		<u> </u>					<u> </u>				0	+			
113	QHSE	05 HSE Local Regulations and Relevant	<ul> <li>Explain the local HSE regulations (Standards, laws and regulations that apply to</li> </ul>															
		International Standards	occupational health and safety).		ļ					<u> </u>	<u> </u>			0	+			
114	QHSE	06 Quality Safety & Management System	<ul> <li>Demonstrate the ability to navigate the company specific Quality Safety &amp; Management</li> </ul>															
			System.	1	1	1			1	1	1			0	1 1			1

# Annex-12 : Competency Table: – Driller 13/20

Position:	Driller		Cor	mpeter	ncy level	require	d		Prof	ficiency	Scale		GAP	Indivi	dual D	evelop	ment Plan
				Req	uired Sc	ore			Ac	ctual Sco	ore						
No Ref	Code Functional competency	Description of competency	Awarene /	Applicati	Career	Advance	Expert	Aware	n Applicat	i Career	Advance	Expert					
115 01/05	07 Chatian Dill/Conservation Damage Diagram	Description to the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of	SS	on	Proficien	d Level	Level	ess	on	Proficie	d Level	Level			-	F	
113 QHSE	07 Station Bill/Emergency Response Plan and Emergency Drills	<ul> <li>Demonstrate the ability to perform the assigned duties as per the station bill/emergency response plan</li> </ul>											0				
	Energency Drins	<ul> <li>Demonstrate the correct donning doffing and stowing of emergency PPF</li> </ul>							-	1			0				
		<ul> <li>Describe all the emergency alarm sounds as well as the respective actions to take (H2S.</li> </ul>							1	1							
		Well Control, Fire Alarm, Abandon Alarm, Gas Alarm, Man overboard Alarm, Loss of															
		Station Position etc).											0			.	
		<ul> <li>Describe and identify the location of your muster point(s).</li> </ul>											0				
		<ul> <li>Describe the process to search and rescue personnel unaccounted for in an emergency</li> </ul>															
		situation.											0				
		<ul> <li>Identify the various site specific emergency equipment (Portable fire extinguishers, fixed</li> </ul>															
116 01/05	00. 5	fire systems such as CO2, Life Boat, Life Raft, Rescue Boat, Escape Ladder etc).								-			0				
110 QHSE	08 Emergency Preparedness and Response	<ul> <li>Demonstrate the assigned duties to be carried out during various emergencies/drills (for example: Fire Drill, Abanden Drill, Gar Drill, Man Querheard Drill, Man Down, Stability</li> </ul>															
		Drill Well Control Drill SOPEP Drill Helpdesk Fire Drill Blackout Drill)											0			i	
		<ul> <li>Demonstrate the proper recording and completion of all emergency response training and</li> </ul>							1	1							
		drills.											0				
		<ul> <li>Describe and identify the escape routes, markings, signage systems and lighting systems</li> </ul>							1								
		as applicable.											0				
		<ul> <li>Describe and identify the location of all emergency alarm actuators.</li> </ul>											0				
		<ul> <li>Describe how to react to well control situations and how often well control drills are</li> </ul>														ı	
		conducted.											0				
		<ul> <li>Describe the rig (unit) emergency response abandonment and notification procedures.</li> </ul>										ļ	0			+	
		Explain the assigned duties to be carried out during various emergencies/drills (for     exemples Fire Daill. Abanden Daill. Cae Daill. Man Quarkeered Daill. Man Dawn, Stability															
		Drill, Well Control Drill, SOPER Drill, Helpdesk Eire Drill, Blackout Drill)											0			i	
		<ul> <li>Explain the oil spill emergency plan(s) (Shipboard Oil Pollution Emergency Plan/Spill</li> </ul>							+	+		-				r t	
		Prevention Control and Countermeasures Plan).											0			i	
		<ul> <li>Explain the site specific emergency responses, exercises and training plans for all major</li> </ul>															
		hazardous situations.											0			i	
117 QHSE	09 Risk Assessments (RA)	<ul> <li>Demonstrate the ability to verify that risk control measurements are implemented and</li> </ul>														ı	
		demonstrate how to assess their effectiveness.											0				
		<ul> <li>Describe and demonstrate how safety critical equipment is tested and maintained.</li> </ul>											0			-+	
		<ul> <li>Describe now simultaneous operations (SIMOPS) are managed to ensure that risk control procedures are in place during the execution of related activities.</li> </ul>											0				
		<ul> <li>Describe the operational boundaries and performance standards of the safety critical</li> </ul>								+					$ \rightarrow $	-+	
		equipment.											0			1	
		<ul> <li>Describe the potential hazards on site and provide examples of what could trigger them</li> </ul>							1								
		and what could be their associated consequences.											0				
		<ul> <li>Describe the process by which potential or unforeseen risks are communicated to</li> </ul>															
		management and affected employees.							4				0			<u> </u>	
		<ul> <li>Describe the process to systematically identify, evaluate, select and implement risk</li> </ul>															
		reducing controls.											0			+	
		<ul> <li>Describe the roles and responsibilities of personnel participating in the risk assessment process</li> </ul>											0				
		<ul> <li>Describe the site specific risk assessment process.</li> </ul>								-			0		$\rightarrow$		
		Explain adverse environmental conditions by which the unit should not operate and the								1				-			
		alerting systems available on site.											0			i	
		Explain and demonstrate how to stop and secure work or tasks in case of any unforeseen														. 1	
		or unplanned changes or hazards, and how to further assess risks associated with these															
		changes or hazards.										ļ	0			┍──┼	
		<ul> <li>Explain how the interaction of major hazards within your unit has been considered during permeters and an invitance of a second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second s</li></ul>							1	1							
		Fynlain bow to apply the bazard recognition and rick assessment techniques and the								+	·	ŀ	U			+	
		<ul> <li>Explain now to apply the nazaru recognition and risk assessment techniques and the ability to implement risk mitigation measurements and controls.</li> </ul>											0				
		<ul> <li>Explain the maintenance and control of risk assessment documents.</li> </ul>							1	1	1	1	ŏ				
		Explain when/if operations can continue when risk associated with simultaneous	t					1	1	1	1						
		operations, inadequate equipment or lack of personnel are present.							1	1	<u> </u>	1	0			L	
		Identify and describe the safety critical equipment on site.										1	0				

#### Annex-12 : Competency Table: – Driller 14/20

Position: Driller		Co	ompeter	ncy level	l required	ł		Prof	iciency :	Scale		GAP	Individu	al Develop	ment Plan
			Req	uired Sc	ore			Ac	tual Sco	ore					
No Ref Code Functional competency	Description of competency	Awarene	Applicati	Career	Advance	Expert	Awaren	Applicati	Career	Advance	Expert				
		SS	on	Proficien	d Level	Level	ess	on	Proficie	d Level	Level				
¹¹⁸ QHSE 10 Permit To Work (PTW)/ Energy Isolations/L.O.T.O.	• Demonstrate control and execution of energy isolation.											0			
	<ul> <li>Describe a scenario where electrical/ mechanical isolations are required.</li> </ul>			1				1	1			0			
	<ul> <li>Describe the objectives of energy isolation and why precautions are important.</li> </ul>											0			
	<ul> <li>Describe what constitutes a critical lift and all the precautions that must be in place.</li> </ul>											0			
	<ul> <li>Explain how electrical/mechanical isolation would be confirmed safe to work on.</li> </ul>											0			
	<ul> <li>Explain the types of energy sources that could be released at the site and the precautions</li> </ul>														
	that need to be in place.								<u> </u>			0			
¹¹⁹ QHSE 11 Behavioral Based Safety System (BBSS)	<ul> <li>Demonstrate the corrective action/feedback process in the BBSS program for an observed</li> </ul>														
	unsafe action/behavior.							ļ	ļ		ļ	0			
	<ul> <li>Demonstrate the process to record and track non conformities from BBSS Observations.</li> </ul>											0			
	<ul> <li>Describe the difference between an unsafe action/behavior and an unsafe condition.</li> </ul>											0			
	<ul> <li>Describe the importance of reviewing past BBSS observations and behaviors at safety</li> </ul>														
	meetings.							-				0	_		
	Describe your role in the BBSS.											0			
120 OUSE 12 Constel Housekeeping (Orderlinger	<ul> <li>Explain the company's BBSS.</li> </ul>						_					0			_
120 QHSE 12 General Housekeeping/Ordeniness	<ul> <li>Demonstrate the ability to secure the current work area or operation before evacuating during an emergency or drill</li> </ul>											0			
	<ul> <li>Demonstrates ability to ensure that the work area is clean and orderly, prior to and upon</li> </ul>							1	1			ŭ			
	completion of the work, task or repairs.											0			
	Demonstrates ability to maintain and inspect hand and power tools in operationally safe														
	condition, without any unauthorized modifications.											0			
	<ul> <li>Explain the hazards associated with using defective or modified hand or power tools.</li> </ul>				-							0			
	<ul> <li>Explain the importance of closing out hazardous work activities before evacuating the area</li> </ul>														
	for an emergency or drill.											0			
	Explain the importance of good housekeeping practices in the work areas and hving     ouarters											0			
	<ul> <li>Explain why it is important to keep tools put away and the work place clean in case of an</li> </ul>		1									ŭ			
	emergency.											0			
	<ul> <li>Explain your role in the housekeeping practices in the work areas and living quarters.</li> </ul>											0			
	<ul> <li>Demonstrate cleaning and organizing the work area upon completion of the work, task, or</li> </ul>														
	repairs.							ļ	ļ			0			
	<ul> <li>Explain procedures personnel should follow if they observe worksite and water pollutants</li> </ul>														
	during lifting operations.	-						ļ	<u> </u>			0			
¹²¹ QHSE 13 Environmental Management Plan	<ul> <li>Describe the company Environmental Management Plan (EMP).</li> </ul>								-			0			
	<ul> <li>Describe the location specific sensitivities of the receiving environment.</li> </ul>											0			
	Describe the process for handling or discharging cuttings.						_	-				0			
122 QHSE 14 Ship Oil Pollution Emergency Plan (SOPEP)	Describe the spill kit contents and how to use them.				$\vdash$		_					0	-		
123 QHSE 15 Spill Prevention Control and Countermeasu	<ul> <li>Describe the rig specific SPCC plan procedures to follow in case of a spill.</li> </ul>											0			
Pidii (SPCC)	Demonstrate the ability to locate the CDCC Plan							+	+			0			
	Demonstrate the ability to locate the SPCC Flan.							+				0			
	Describe the SPCC inspection process for the location and equipment before soud in		+									0			
	<ul> <li>Describe the spill kit contents and how to use them.</li> </ul>		+		<u> </u> -			+	<u> </u>			0			
	<ul> <li>Explain how the SPCC plan bridges to the operator's well site plan.</li> </ul>		1					1	1			0 0			
	Explain the process or requirements of training on the SPCC elements.		1					1	1			0			
	• Explain the reporting procedures in the event of a spill on or off the well site location.		1					1	1	1	<u> </u>	0			
	<ul> <li>Explain the SPCC containment system including the layout, need and maintenance.</li> </ul>											0			
	<ul> <li>Explain your role in a SPCC drill or an actual spill.</li> </ul>											0			

# Annex-12 : Competency Table: – Driller 15/20

Posit	ion:	Driller			Compe	tency le	vel requ	ired		Prof	ficiency	Scale		GAP	Indi	vidual D	Develop	ment Plan
					F	Required	Score			Ac	tual Sco	ore						
No	Ref	Code Functional competency	Description of competency	A	warene Appli	cati Caree	r Advan	e Expert	Awaren	Applicati	i Career	Advance	Expert					
124	0.1105				SS OI	n Profici	en d Leve	Level	ess	on	Proficie	d Level	Level				<del></del>	
124	QHSE	16 Waste Segregation	<ul> <li>Describe the company waste management plan.</li> </ul>											0				
			<ul> <li>Describe the waste materials (either solid or liquid), and identify/categorize as one of the fellowing constant waste industrial waste becaude a solid or right as a solid bla sectorial.</li> </ul>											~				
			Describe whet meterials about the placed into the works and recyclable materials.											0				
			<ul> <li>Describe what materials should be placed into the waste containers and why they need to be sogregated</li> </ul>															
			De segregateu. Evaluation the continuous improvement of waste handling on the unit/location											0				
			Explain the waste containers provided for common waste industrial waste hazardous							1							┝──┼╴	
			waste and recyclable materials											0				
125	OHSE	17 Dropped Objects Prevention	Describe the bazards associated while work is being conducted overhead											0		+	$\vdash$	
			<ul> <li>Describe the main hazard areas/zones where dropped objects may occur.</li> </ul>							1				0		+		
			Explain how potential dropped objects are identified and how they should be reported.											0				
			Explain how the restricted areas/zones are enforced.											0				
			• Explain precautionary measures required to avoid causing dropped objects and to protect							1								
			personnel from those potential hazards.											0				
			<ul> <li>Explain the importance of a daily/weekly/monthly/annual dropped objects prevention</li> </ul>															
			inspection program.											0				
			<ul> <li>Explain why access should be restricted to all known dropped object areas/zones.</li> </ul>											0				
126	QHSE	19 Fall Protection	<ul> <li>Demonstrate the ability to find the fall arrest or restraint gear/equipment's information</li> </ul>															
			tag.							ļ				0		4	ļļ.	
			Demonstrate the ability to select the proper size and type as well as the donning of, and															
			correct usage, of fall arrest gear.							ļ				0			ļļ-	
			<ul> <li>Demonstrate transferring from one location to another while maintaining 100 percent tie</li> </ul>															
			off while working at heights.											0			┝──┾	
			<ul> <li>Describe the difference between fail arrest and fail restraint.</li> </ul>							+				0				
			<ul> <li>Describe the emergency equipment and procedures (rescue plan) when rescuing someone at heights.</li> </ul>															
			Describe the general requirements of the fall protection											0				
			<ul> <li>Describe the general requirements of the rain protection.</li> <li>Describe the limitations and the common misuse of fall arrest and restraint equipment</li> </ul>								+	+		0				
			<ul> <li>Describe the management of defective fall arrest equipment.</li> </ul>							1				0	_	++		
			<ul> <li>Describe the proper maintenance, cleaning, inspection (including documentation) and</li> </ul>							1	1	1	-			++		
			storage of fall arrest equipment.											0				
			<ul> <li>Describe the proper use of ladders (fixed and portable) or scaffolds.</li> </ul>							1				0				
			<ul> <li>Describe the proper work procedures and communication using fall protection while</li> </ul>							1								
			working in an aerial lift platform (man-lift/work basket).									<u> </u>		0				
			<ul> <li>Describe the types of fall protection and fall arrest gear/equipment and how it is used.</li> </ul>							1				0		]	ļ	
			<ul> <li>Explain the different types of fall protection and fall arrest systems and how each of them</li> </ul>															
			work.							ļ				0			ļļ.	
			Explain the importance of maintaining the proper overhead anchorage point.											0				

# Annex-12 : Competency Table: – Driller 16/20

Position:	Driller		Com	peten	cy level	required			Prof	iciency S	Scale		GAP	Indiv	idual Dev	velopme	nt Plan
				Requ	uired Sc	ore			Ac	tual Sco	re						
No Ref	Code Functional competency	Description of competency	Awarene Ap	plicati	Career	Advance I	Expert	Awaren	Applicati	Career	Advance	Expert					
127 OHSE	20 Safe Lise Of Lifting Equipment	Evaluin who is authorized to operate lifting equipment	55	on	Proficien	d Level	Level	ess	on	Proficie	d Level	Level	0	—	<del></del>		-
TT, QHSE	20 Sale Ose Of Lifting Equipment	Explain who is authorized to operate inting equipment.     Demonstrate proper band and body placement when attaching the rigging to a load											0				+
		Demonstrate the ability to properly operate lifting equipment											0		$\vdash$		+
		Demonstrate the ability to select the correct lifting equipment for the task at hand							+				0		tt-		
		Demonstrate the proper use of tag lines attached to loads including proper positioning.									-		0	-	+		+
		<ul> <li>Demonstrate the verbal communications and hand signals used in lifting operations.</li> </ul>		1					1		t		0		t		
		Describe the basic work sequence/policy and precautions that must be in place prior to							1								1
		making a critical lift.							1				0				
		<ul> <li>Describe the lifting equipment available on location.</li> </ul>							1				0				1
		<ul> <li>Describe the maintenance, storage and inspection of all lifting equipment</li> </ul>							1								T
		(rigging/slings/shackles, etc.).											0				
		<ul> <li>Describe the proper installation and rigging of all permanent and temporary lifting points</li> </ul>															
		(anchor points, pad eyes, etc.).											0				
		<ul> <li>Describe the proper use of tag lines attached to loads including proper positioning and</li> </ul>															
		quantity.							ļ				0				
		<ul> <li>Describe the verbal communications and hand signals used in lifting operations.</li> </ul>							ļ				0				
		<ul> <li>Explain proper hand and body placement when attaching the rigging to a load.</li> </ul>							ļ				0		ļ		
		<ul> <li>Explain the importance of a spotter during blind lifting operations.</li> </ul>											0		<u> </u>		
		<ul> <li>Explain the minimum number of personnel and special precautions to be used during</li> </ul>															
		critical lifting operations.											0	_			
		<ul> <li>Explain the pre-lift plan and inspections process.</li> </ul>							<u> </u>				0				
		<ul> <li>Explain the responsibilities of a rigger (banksman).</li> </ul>											0				
139 0005	24 1101 (2)	Explain what constitutes a critical lift.						_					0	+	+		
120 QHSE	21 Lifting of Personnel	<ul> <li>Demonstrate the ability to properly utilize personnel lifting equipment.</li> </ul>											0		+		
		<ul> <li>Demonstrate the ability to select the proper personnel lifting equipment/device.</li> </ul>											0		┼┼		
		Demonstrate the inspection of personnel lifting equipment.     Describe safety processing personnel for the use of personnel lifting devices							+				0				
		Evaluation conditions authority and hand signals personal to stop personnel lifting							-				0		++		+
		Constantions, authority, and hand signals necessary to stop personner inting     operations											0				
		Explain the importance of using load balance, weight tolerances, and environmental							+						tt		
		conditions before and during personnel transfer.											0				
		<ul> <li>Explain the inspection of equipment necessary for lifting of personnel.</li> </ul>							1				0				
		<ul> <li>Explain the precautions and pre-lift requirements before personnel are transferred or</li> </ul>		İ					1		1				1		1
		lifted.											0				
129 QHSE	22 Crane Safety	<ul> <li>Describe the maintenance, storage and inspection of all lifting equipment</li> </ul>															1
		(rigging/slings/shackles, etc.).											0				
130 QHSE	23 Use and maintenance of utility winch	<ul> <li>Demonstrate rigging practices for safe lifting and movement of tubulars and irregular</li> </ul>															
		shaped equipment/materials.											0				
		<ul> <li>Demonstrate the hand signals used during winch operations.</li> </ul>							1				0				
		<ul> <li>Demonstrate the operation of a utility winch.</li> </ul>							<u> </u>				0				
		<ul> <li>Describe the operational and safety responsibilities of a winch operator.</li> </ul>		l					1				0				
		<ul> <li>Describe the specific locations where utility winches are installed on the unit.</li> </ul>											0				
		<ul> <li>Explain rigging practices for safe lifting and movement of tubulars and irregular shaped</li> </ul>															
		equipment/materials.								ļ			0				
		<ul> <li>Explain the capacity and limitations of utility winches.</li> </ul>							ļ	ļ			0				
		Explain the pre-use inspection steps required before operating a utility winch.							ļ	ļ			0		+		
121	AF 4 11 1/1 11 11 11 11	Explain the required maintenance for a utility winch and accessories.							1				U	+	┢━╋	—	
131 QHSE	25 Accident/Incident Investigation	<ul> <li>Explain the company's policies/procedures for reporting an incident resulting in personal incident according to a second procedures for reporting and incident resulting in personal</li> </ul>						1									
		injury, equipment damage, a near miss or any potential nazard.							-				U	+	+		
		<ul> <li>Explain the importance of active participation in an incident investigation.</li> <li>Evaluate the importance of following up and closing corrective actions.</li> </ul>							+				0		+		+
		<ul> <li>Explain the importance or following up and closing corrective actions.</li> <li>Evaluate the corrective action is and why it is being implemented.</li> </ul>							+								
		<ul> <li>Explain what a corrective action is and why it is being implemented.</li> <li>Evaluate why facts are important to an incident investigation.</li> </ul>						-	+				0		+		+
		<ul> <li>Explain why facts are important to an incluent investigation.</li> </ul>							1	1			U	_1			1

# Annex-12 : Competency Table: – Driller 17/20

Position:	Driller		C	ompet <u>e</u>	ncy level	l require	d		Profi	ciency	Scale		GAP	Indivi	dual Deve	lopmen	t Plan
				Req	uired Sc	ore			Act	tual Sco	ore						
No Ref	Code Functional competency	Description of competency	Awarene	Applicati	Career	Advance	Expert	Awaren	Applicati	Career	Advance	Expert					
			SS	on	Proficien	d Level	Level	ess	on	Proficie	d Level	Level		_		<u> </u>	<u> </u>
132 QHSE	26 Chemical Handling & SDS (MSDS) (GHS)	<ul> <li>Demonstrate selection and correct use of PPE when handling chemicals in accordance with the SDS.</li> </ul>											0				
		<ul> <li>Describe appropriate actions necessary in the event of exposure/contact with chemicals or spill.</li> </ul>											0				
		<ul> <li>Describe the health and environmental risks associated with chemicals used at the work cite</li> </ul>											0				
		<ul> <li>Describe the information contained in a SDS.</li> </ul>		+									0				
		<ul> <li>Describe the storage and segregation process for chemicals.</li> </ul>		1									0				
		<ul> <li>Explain the minimum requirements for labeling, documentation and packing of chemicals.</li> </ul>		1	1	1							0				
		Explain what NORM is, where NORM occurs and explain the precautions to be taken to								1							
		prevent exposure.											0				
		<ul> <li>Explain where Safety Data Sheets (SDS) are located.</li> </ul>											0				
133 QHSE	27 Equipment Safety	<ul> <li>Describe and give examples of various equipment guards and their purpose.</li> </ul>											0				
		<ul> <li>Explain the hazards and precautions of working around moving (dynamic) equipment.</li> </ul>											0				
		<ul> <li>Explain the hazards and precautions of working around rotating equipment.</li> </ul>			ļ					ļ			0				ļ
		<ul> <li>Explain the hazards and precautions to take when working with or near low or high</li> </ul>															
		pressurized equipment.								ļ			0				ļ
		Explain the importance of ensuring that proper fittings (hammer unions/quick															
		connect/hydraulic fittings) are being used in piping, hoses and equipment.								ļ			0	_		<u> </u>	$\vdash$
134 QHSE	29 Personal Protective Equipment (PPE)	<ul> <li>Demonstrate the proper selection and usage (donning/doffing) of PPE.</li> </ul>	·····										0				
													0				
													0				
135 OHSE	20 Manual Handling/Ergonomics/Posture	Demonstrate how to support a load when walking with various size loads	-	+									0	-			+
QIISE	50 Manual Handling/Ergonomics/Fosture	Demonstrate how to support a load when waking with valious size loads.		1									0			-	$\square$
		Describe when mechanical lifting is preferred to manual lifting and why											0				
		<ul> <li>Describe where the force is concentrated on the spine when improperly lifting or setting a</li> </ul>		+									·····				
		load.											0				
		Explain the company's policy and procedures on the manual handling/lifting of materials.			1								0				
		Explain the importance of planning your path of movement prior to lifting and carrying a															
		load.											0				
		<ul> <li>Explain the proper manual lifting or setting techniques to prevent back injuries as well as</li> </ul>															
		the benefits of using mechanical lifting devices.								ļ			0				ļ
		Explain the value of manually "testing a load" before attempting to lift the load.								<u> </u>			0				
136 QHSE	31 Confined Space Entry	<ul> <li>Describe what constitutes a confined space entry.</li> </ul>			ļ								0				
		Explain how environmental conditions can negatively impact working in a confined space.											0				ļ
		Explain the company's policy on confined space entry.								ļ			0				
		<ul> <li>Explain the hazards associated with a confined space.</li> </ul>											0				
		<ul> <li>Explain the importance of using atmospheric monitoring equipment in a confined space.</li> </ul>			+								0				<u> </u>
		Explain the procedures to take before entering a confined space.								ļ			0				
		<ul> <li>Explain the procedures to take upon entering a contined space.</li> <li>Evaluate the required DDE needed when warking in a confined space.</li> </ul>											0				
		<ul> <li>Explain the required PPE needed when working in a contined space.</li> <li>Explain what a competent perception is in the context of regulatory standards covering.</li> </ul>		+									0			+	$\vdash$
		<ul> <li>Explain what a competent person is in the context of regulatory standards covering confined space entry</li> </ul>						1					0				
		<ul> <li>Explain what a qualified person is in the context of regulatory standards covering confined</li> </ul>		+	+				1		1						<u>+</u>
		<ul> <li>Explain while a qualified person is in the context of regulatory standards covering contined space entry.</li> </ul>						1					0				
		Explain what and how to identify a confined space and give some examples on your		1	1				1	1	1						<u>†</u>
		worksite.						1					0				
		Explain why it is important to continually monitor the atmosphere of a confined space.			1	1			1	1	1		0				
		Explain your role and responsibility during a confined space rescue operation.											0				

# Annex-12 : Competency Table: – Driller 18/20

Position:	Driller		Com	petency leve	el require	d		Profi	ciency S	icale		GAP	Indiv	idual Dev	velopme	nt Plan
				Required S	core			Act	tual Sco	re				_		
No Ref	Code Functional competency	Description of competency	Awarene Ap	pplicati Career	Advance	Expert	Awaren	Applicati	Career	Advance E	xpert					
127 01/05			SS	on Proficien	d Level	Level	ess	on	Proficie	d Level	Level			<del></del>		
137 QHSE	32 Severe Weather Conditions	<ul> <li>Demonstrate the ability to recognize operational shut down point(s).</li> </ul>										0		+		
		<ul> <li>Describe actions to be taken to protect personnel during severe weather conditions.</li> <li>Describe approximations which may be impacted by cause weather and the actions taken to</li> </ul>										0		+		
		mitigate it										0				
		<ul> <li>Describe the process to restart operations after a severe weather event.</li> </ul>										0		+		+
		<ul> <li>Describe the process to secure the unit, before evacuating, when a severe weather alert</li> </ul>			1											
		has been issued.										0				
		• Explain the company's policy and procedures to follow during a severe weather threat.										0	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~			1
¹³⁸ QHSE	33 Fire Prevention, Fire Fighting and Fire Control and Gas/Fire Detection Equipment	Demonstrate the use of portable fire extinguishers.										0				
		<ul> <li>Describe the company's policies and procedures for fire prevention.</li> </ul>										0				
		<ul> <li>Describe the different types of portable fire extinguishers and their applications (Water,</li> </ul>														
		Carbon Dioxide and Dry Chemical).										0				
		<ul> <li>Describe the engine shutdown procedure in the event of a gas release.</li> </ul>			+				<b> </b>			0		+		
		Describe the fire and gas detection systems, sensor locations and how they function.										0		+		
		<ul> <li>Describe the fixed and/or portable systems used to detect the presence of oxygen (O2), Hydrocarbon (HC) and Hydrogen Sylphide (H2S) atc.</li> </ul>										0				
		<ul> <li>Describe the passive fire protection systems on the unit including their location and</li> </ul>												+		+
		rating.										0				
		Describe the process and documentation needed for inspecting and maintaining portable			1			1								1
		fire extinguishers.										0				
		<ul> <li>Describe the process for inspecting, maintaining, testing and calibrating the fire and gas</li> </ul>														
		detection systems.										0				
		<ul> <li>Describe the testing and regulatory requirements for portable fire extinguishers.</li> </ul>							ļ			0		+		
		<ul> <li>Describe the three elements to complete the fire triangle.</li> <li>Describe the three elements to complete the fire triangle.</li> </ul>										0				
		Describe the thresholds and the actions automatically initiated on detection of HC and/of H2S										0				
		<ul> <li>Explain the different levels of shutdown associated with the unit (if applicable)</li> </ul>										0		++-		
		<ul> <li>Explain the unrefer reversion should will associated with the unrefer applicable).</li> <li>Explain the rig/unit emergency action (response) plan for a fire event.</li> </ul>										0		+		
		<ul> <li>Explain the use of portable fire extinguishers.</li> </ul>			1							0		+		-
139 QHSE	34 Occupational Health Plan	Explain the process for monitoring occupational health exposures.			1							0				1
		<ul> <li>Explain the company occupational health protection plan.</li> </ul>										0				
		<ul> <li>Explain the exposures (noise, vibration, heat, etc) that are unacceptable.</li> </ul>										0				
		<ul> <li>Explain the process to identify, set, control and verify the exposure limits that could</li> </ul>														
	· · · ·	prevent potential acute and or chronic health hazards.										0	_	—		<u> </u>
140 QHSE	35 Simultaneous Operations	<ul> <li>Describe management of change and why it is important when conducting SIMOPS</li> </ul>														
		operations.										0				
		<ul> <li>Describe what constitutes a SilviOPS Plan.</li> <li>Evelais Step Work Authority and who is reasonability to initiate when a potential risk is</li> </ul>										0				
		Explain stop work Authority and who is responsible to initiate when a potential risk is     nresent										0				
		<ul> <li>Explain the elements of the SIMOPS Plan.</li> </ul>					1					0		+		+
		<ul> <li>Explain the summary of operational boundaries and the difference between proceed,</li> </ul>			1				†				-	1		
1		proceed with caution and stop operations.										0				
¹⁴¹ QHSE	36 Powered/Manual Tools	Describe your company's powered/manual tool policy.										0				
		• Explain the importance of inspection, maintenance and storage of powered/manual tools.										0				
1		<ul> <li>Explain the importance of removing defective or altered powered/manual tools.</li> </ul>										0				
		Explain the importance of using the proper powered/manual tool for the task at hand.										0		ļļ.		
		<ul> <li>Explain the required PPE and safe procedures for operating powered/manual tools.</li> </ul>										0				

# Annex-12 : Competency Table: - Driller 19/20

Position:	Driller		C	ompete	ncy leve	l require	ed		Prof	ficiency	Scale		GAP	Indi	vidual I	Develop	ment Plan
				Req	uired So	core			Ac	ctual Sc	ore						
No Ref	Code Functional competency	Description of competency	Awarene	Applicati	Career	Advance	Expert	Aware	n Applicat	ti Career	Advance	Expert					
142 004	A4 Designment Control	Demonstrate less less des service en file des des sisteries d	SS	on	Proficien	d Level	Level	ess	on	Proficie	d Level	Level		_	<u> </u>	<del></del>	1
142 KIVI	A1 Document Control	Demonstrate now handover records are filed and maintained.     Demonstrate the ability to accurately complete the IADC Daily Drilling Report							+				0			++	
		Demonstrate the ability to accurately complete the IADC Daily Drining Report.											0		+	+	
		Alerts /Notifications /Best Practices) through closure											0				
		Demonstrate the ability to communicate to all current operations		1									0		+	++	
		<ul> <li>Demonstrate the ability to complete a handover report, note and form.</li> </ul>											0			1	
		<ul> <li>Demonstrate the ability to order, receive, distribute and track inventory.</li> </ul>		1					+				0			++	
		<ul> <li>Demonstrate the ability to store inventory items including dangerous goods.</li> </ul>		1	1	1				1	1		0		-	1	1
		Demonstrate the execution and application of a management of change request.		1						1			0	_	1		
		<ul> <li>Demonstrate the handover procedure.</li> </ul>											0		1		
		<ul> <li>Describe the personnel involved in the development, implementation and maintenance of</li> </ul>															
		written policy and procedure standards.		ļ									0				
		<ul> <li>Describe where operational documentation is maintained.</li> </ul>		<u> </u>									0				
		<ul> <li>Explain how each business unit will utilize the quality and control system.</li> </ul>											0				
		<ul> <li>Explain how written policy and procedure standards are implemented into the current</li> </ul>															
		workforce and new hire process.									÷		0			++	
		<ul> <li>Explain the Company policy and procedure for the handover process.</li> </ul>		+									0				
		<ul> <li>Explain the Company policy and procedures for the storage of inventory items including dangerous goods.</li> </ul>											0				
		Explain the Company policy and procedures on operations and HSE communications		+					+				0		+	+	
		Explain the company policy and procedures on operations and rise communications.      Explain the Company policy on documentation control		+					+	+	+	1	0			++	
		<ul> <li>Explain the company process for implementing and maintaining a bridging document.</li> </ul>											0			++	
		<ul> <li>Explain the Company process for issuing, distributing and responding to communication</li> </ul>		1					1	1	1		-	_	+		
		documents (Alerts/Notifications/Best Practices).		1									0				
		<ul> <li>Explain the Company process for maintaining the daily drilling reports.</li> </ul>		1									0		1		
		<ul> <li>Explain the Company process to ensure that all drawings, diagrams and procedures are</li> </ul>													T		
		current.											0			1	
		<ul> <li>Explain the Company's material inventory and parts list including the vendor's</li> </ul>															
		nomenclature (name) of the part.		ļ									0			<u> </u>	
		<ul> <li>Explain the Company's policies and procedures for quality control.</li> </ul>											0				
		<ul> <li>Explain the Company's policy and procedures on the completion of and distribution/filing              chick IADC Dally Definition         </li> </ul>															
		or the IADC Daily Drilling Report.									+					++	
		<ul> <li>Explain the company's process for the development of written policy and procedure standards.</li> </ul>											0				
		Explain the Company's policy and procedures for inventory management											0			++	
		<ul> <li>Explain the company's policy and proceeders for intensity management.</li> <li>Explain the Company's policy for management of change.</li> </ul>		1					1	1			0		1		
		<ul> <li>Explain the Company's procedure for document tracking and retention.</li> </ul>		1						1			0				
		<ul> <li>Explain the Company's procedures for a management of change, including team</li> </ul>		1											-	1	
		member's roles and responsibilities.											0				
		<ul> <li>Explain the documentation control procedure and which personnel are involved in the</li> </ul>															
		filing of operational documentation.			L								0		_		
		<ul> <li>Explain the importance of accurately completing the IADC Daily Drilling Report.</li> </ul>		ļ								1	0				
		<ul> <li>Explain the importance of effective document control.</li> </ul>								-			0				
		<ul> <li>Explain the importance of ensuring that handover reports are understood and signed off</li> </ul>															
		by outgoing and incoming personnel.											0			++	
		Explain the importance of handover reports.											0			++	
		<ul> <li>Explain the importance of operations and HSE communications throughout the Company.</li> <li>Evaluate what quality and control custom is used by the Company.</li> </ul>		+					+	+	+	}	0		+	++	
		Explain what quality and control system is used by the company.     Explain who is responsible for completing the IADC Daily Drilling Report									+		0			+-+	
		Explain who is responsible for revising documentation and describe how to recognize the		1					1	+	1	1		*****	+	+-+	
		latest version.											0				
		<ul> <li>Explain who is responsible for updating the HSE policy and procedures and what is the</li> </ul>		1					1	1	1		-1		1	+	
		process.											0				
		<ul> <li>Explain why proper review, approval and document control are essential parts of</li> </ul>		1	1				1						T	T	
		management of change requests.											0				

#### Annex-12 : Competency Table: – Driller 20/20

Pos	tion:	Driller				Compete	ency lev	el requir	ed		Pro	ficiency	Scale		GAP	Individ	ual Developme	nt Plan
						Re	quired S	Score			A	ctual Sc	ore					
No	Ref	Code	Functional competency	Description of competency	Aware ss	ne Applicat on	ti Career Proficie	Advance n d Level	Expert Level	Awarer ess	n Applicat on	ti Career Proficie	Advance d Level	Expert Level				
143	SS	17 Trai	nsportation	<ul> <li>Demonstrate the proper procedure to approach the helicopter when boarding and exiting the aircraft.</li> <li>Describe the Company's helicopter transportation policy.</li> <li>Describe the Company's motor vehicle policy.</li> <li>Describe the Company's motor vehicle policy.</li> <li>Describe the mergency response procedures and equipment associated with helicopter operations.</li> <li>Describe the importance of journey management (trip planning).</li> <li>Describe the proper procedure to approach the helicopter when boarding and exiting the aircraft.</li> <li>Describe what constitutes being fit for duty when operating a motor vehicle.</li> <li>Explain the importance of a "walk around" inspection (fluids, fuel, tire pressure etc.) before entering a vehicle and putting it into motion.</li> <li>Explain who is in total command of the helicopter and who will make decisions concerning the flight and personnel allowed onboard.</li> </ul>														
					Maxi	mum Sco	or O			Actua	l Score	0			0			

#### Annex-13 : Competency Table: – Toolpusher 1/20

Position:	Toolpusher			Compete	ency level	required			Profi	iciency S	Scale		GAP	Individual Developmen	ent Plan
				Re	quired Sco	ore			Ac	tual Sco	re				
No Code No	Functional competency	Description of competency	Awareness	Application	Career	Advanced	Expert	Awarene	Applicati	Career	Advance E	xpert			
	······································		1	2	Proficient	Level	Level	SS	on	Proficien	d Level	evel			
1 CO 01	Crane Basics	<ul> <li>Demonstrate ability to follow the permit-to-work and lockout/tagout procedures required</li> </ul>											0		
		for crane operations.											0		
		<ul> <li>Describe the lifting equipment available on current location.</li> </ul>		L									0		
		<ul> <li>Describe the type(s) of crane(s) by name and type, found on current location.</li> </ul>			1								0		
		<ul> <li>Locate company policies and procedures that apply to crane operations.</li> </ul>											0		
2 CO 02	Rigger Basics	Demonstrate ability to use all rigging hitches (e.g., basket, choker, vertical, bridle) needed													
		for the current job.											0		
		<ul> <li>Demonstrate adhering to the permit-to-work for routine and non-routine rigging tasks, if</li> </ul>			1										
		applicable.											0		
		<ul> <li>Demonstrate correct and safe use of taglines attached to loads, including proper</li> </ul>			1										1
		positioning and quantity.											U		
		<ul> <li>Demonstrate following the lift plan required for critical lift rigging tasks.</li> </ul>		1	1				1				0		1
		Demonstrate how to correctly rig a load according to its specific center of gravity.			1								0		
		<ul> <li>Demonstrate the ability to control an area where lifting operations are being carried out.</li> </ul>		1									0		
		<ul> <li>Demonstrate the ability to correctly and safely connect/disconnect loads.</li> </ul>		1	1								0		
		<ul> <li>Demonstrate the ability to correctly secure cargo in various conditions.</li> </ul>			1								0		
		<ul> <li>Demonstrate the ability to find the center of gravity of a load.</li> </ul>		1	1								0		
		<ul> <li>Demonstrate the ability to select the appropriate rigging equipment for a specific job.</li> </ul>			1				1				0		
		<ul> <li>Demonstrate the use of sling capacity tables.</li> </ul>	******	1									0		
		<ul> <li>Determine and/or estimate weight of loads for the purpose of rigging safely.</li> </ul>			1								0		
		<ul> <li>Explain center of gravity as it relates to rigging.</li> </ul>											0		
		<ul> <li>Explain how the tension or loading increases as sling angles decrease, especially the rapid</li> </ul>													
		increase in tension that occurs when slings are used below 30 degrees.											0		
		Explain the different methods in which a slings are rigged or attached to load.			1								0		
		Explain the importance of the eve of a synthetic web and why it should never be used or		<u>†</u>											
		forced over a book or nin											0		
		<ul> <li>Explain the importance of using padding (protection over sharp edges)</li> </ul>			+								0		
		Explain the use of rush roles if required by company rolicy		1	1								0		
		<ul> <li>Explain vertical and horizontal planes as they relate to rigging (e.g. how force is</li> </ul>			+								Ŭ		
		distributed based on the plane)											0		
		Locate company policies and procedures that apply to rigging			1								0		
		Select company policies and procedures that apply to higging.     Select correct slings, or other similar lifting devices, according to size, weight, and		+	+								······		
		<ul> <li>Select confect sings, or other sinniar inting devices, according to size, weight, and configuration</li> </ul>											0		
2 (0 02	Conoral Pigger Qualifications and Polo	Evaluation     Evaluation     Evaluation     Evaluation											0		
5 CO US	General Rigger Qualifications and Role	Explain the basic rigger's role in ensuring sale inting operations.	~~~~~~~~~~~		+								······		
		<ul> <li>Explain the basic rigger's role in ensuring that an inting gear is certified to company and regulatory requirements</li> </ul>											0		
		Evaluation who at the inherite is authorized to use rigging hardware			+										
		<ul> <li>Explain who at the jobsite is authorized to use rigging hardware.</li> <li>List the recommanded qualifications, experience, and training necessary to be able to rig a</li> </ul>													
		<ul> <li>List the recommended quantizations, experience, and training necessary to be able to fig a load (see API PP 16, 2d, latest edition).</li> </ul>											0		
4 60 04	Conserved Dispersional Union Andrewson Information	Describe the associate listice and similar of all associate and terrore lifting asists													-
4 CO 04	General Rigging Hardware Information	<ul> <li>Describe the proper installation and rigging or all permanent and temporary lifting points (anchor points and avec, atc.)</li> </ul>											0		
		(anchor points, pauleyes, etc.).			+										
F 60 05	Dississ Handward Inconstinue & Marintanana	<ul> <li>Describe the storage requirements for all rigging hardware (rigging/slings/shackles, etc.).</li> </ul>											0		
5 CU 05	Rigging naroware inspection & waintenance	<ul> <li>Demonstrate ability to maintain and inspect hand and power tools in operationally safe</li> </ul>											0		
		condition, without any unauthorized modifications.													
		<ul> <li>Explain procedures to follow when defective rigging nardware is identified.</li> </ul>			+								0		
6 60 15		<ul> <li>Explain the lifting gear color-coding system and now records are kept for each item.</li> </ul>											U		-
6 CO 10	General Crane Operation HSE	<ul> <li>Explain why personnel should observe and report any fluid leaks from the crane that could</li> </ul>											0		
		be contaminating the work environment and affecting safe operations.				-			ļ					<u>├</u>	
		<ul> <li>Explain your Stop Work Authority when you observe an unsafe act during lifting</li> </ul>											0		
		operations.			ļ				<u> </u>						_
7 CO 15	General Rigging HSE	<ul> <li>Demonstrate ability to ensure that deck personnel use safe lifting procedures (e.g., tag</li> </ul>											0		
		lines, escape routes).			ļ	ļ			ļ				-		
		<ul> <li>Demonstrate correct use of personal protective equipment.</li> </ul>	1	1				11					0		

#### Annex-13 : Competency Table: – Toolpusher 2/20

Position: Toolpusher				Compete	ency level	required			Profi	ciency S	cale	GAP	Individual Development Pla
				Re	quired Sco	ore			Act	tual Scor	e		
No Code No Functional competency		Description of competency	Awareness	Application	Career	Advanced	Expert	Awarene	Applicati	Career	Advance Expert		
			1	2	Proficient	Level	Level	SS	on	Proficien	d Level Level		
8 CO 16 Crane/Rigging Operations Co	mmunications	Demonstrate ability to write clear and concise reports, such as those involving near- misses and incidents, involving lifting operations										0	
9 CO 17 Personnel: Lifting Operations	•	Demonstrate how to properly utilize personnel lifting equipment										0	
s co in resonnen intilig operations	•	Demonstrate how to select the proper personnel lifting equipment/device.			1							0	
	• E	Explain conditions, authority, and hand signals necessary to stop personnel lifting										0	
	c	operations.										0	
	• E	Explain the importance of load balance, weight tolerances, and environmental conditions										0	
		perore and during personnel transfer. Evaluin the processions and pro-lift requirements applicable before personnel are											
	•	transferred or lifted										0	
10 CO 18 Offboard/Onboard Supply Bo	at Lifting 🛛 🗧	Demonstrate how to properly utilize personnel lifting equipment.											
Operations	Ū.											0	
	• [	Demonstrate how to select the proper personnel lifting equipment/device.										0	
	• •	Describe the basic work sequence/policy followed prior to making a critical lift.			-							0	
	• E	Explain conditions, authority, and hand signals necessary to stop personnel lifting										0	
	• •	operations. Explain the importance of load balance, weight tolerances, and environmental conditions.		<u> </u>	+								+
	•	before and during personnel transfer.										0	
	• E	Explain the precautions and pre-lift requirements applicable before personnel are		1									
	t	transferred or lifted.										0	
11 CO 20 General Housekeeping/Order	liness 🛛 🖲 🛛	Demonstrate cleaning and organizing the work area upon completion of the work, task, or										0	
	r	repairs.		ļ	ļ								
	• E	Explain procedures personnel should follow if they observe worksite and water pollutants										0	
12 DI 01 Pig Move (Skidding (Malking)	Skidding Big	during lifting operations.											
with BOP Suspended		Demonstrate now to secure the bor for transit.										0	
	• E	Explain the need to assign watchmen to important areas during transit.			1							0	
	• [	Demonstrate ability to coach drill crews on how to be able to position rig on well center.										0	
	• [	Demonstrate ability to utilize correct measuring methods and techniques to position rig										0	
		on well center.											
13 DL 03 Rig Move (Skidding/Walking):	Unload and	Demonstrate ability to spot matting boards as per rig design.										0	
14 DI 04 Big Move (Skidding (Walking))	Well Control	Demonstrate the ability to install choke, flow, flare, and diverter lines			-								
Fauipment		Demonstrate the ability to install choke, now, hare, and diverter lines.										0	
15 DL 05 Rig Up: Unload and install ma	itting boards	Demonstrate ability to ensure only approved and certified lifting equipment is utilized.										0	
DL 05 Rig Up: Unload and install ma	itting boards 🛛 🖲 🛛	Demonstrate the ability to recognize approved and certified lifting equipment.			1							0	
16 DL 06 Rig Up: Spot & Assemble Sub	tructure Base & 🏾 🗨 🛛	Demonstrate ability to spot sub base on well center as per rig design.										0	
Associated Bracing													
17 DL 07 Rig Up: Spot & Assemble Sha	ker Tanks, 🛛 🖲 [	Demonstrate ability to inspect and tighten all hammer seal unions to equalizer and mud											
Intermediate Tanks, Suction	anks &/or r	mixing lines.										0	
Reserve ranks	• 1	Demonstrate ability to properly earth ground equipment.										0	
	•	Demonstrate ability to properly carrier ground equipments										0	
18 DL 08 Rig Up: Spot Mud Pumps & A	ssemble All 🛛 🚺	Demonstrate the ability to spot mud pumps and rig up all associated plumbing and		1	1								
Suction Lines, Pressure Relea	se Lines & Braces o	operating lines.										U	
19 DL 09 Spot & Assemble Suitcases ar	nd lines 🛛 🔍 🛙	Demonstrate ability to inspect and tighten all hammer seal unions between suitcases to								Т		0	
	-	prevent fluid or air leaks.		ļ								ļ	
	•	Demonstrate ability to properly earth ground equipment.										0	
20 DI 10 Big Lin: Spot & Big up Big Pou	ver Package &	Demonstrate ability to spot suitcase level, in proper order and in line as per rig design.		+								U	
Fuel Tank		bemonstrate ability to properly instantal electricity connections and ruler infes.										0	
	• [	Demonstrate ability to spot power package & fuel tank level, in proper order and in line as		1									
	F	per rig design.										U	

#### Annex-13 : Competency Table: – Toolpusher 3/20

Position:	Toolpusher			Compete	ency level	required			Profi	ciency S	Scale		GAP	Individual Development Plan
	-			Re	auired Sco	ore			Ac	tual Sco	re			
No. Code No.	Eunctional competency	Description of competency	Awareness	Application	Career	Advanced	Expert	Awarene	Applicati	Career	Advance	Expert		
No coueno	r unctional competency	Description of competency	1	2	Proficient	Level	Level	ss	on	Proficien	d Level	Level		
21 DL 11	Rig Up: Startup & Energize Rig Power	Demonstrate the ability to start up generators and VFD/SCR systems.			1								0	
22 DL 12	Rig Up: Assemble Rig Floor structural supports	Demonstrate ability to install structual supports.											0	
23 DL 13	Rig Up: Rotary system	Demonstrate ability to rig up rotary and applicable drive system.											0	
24 DL 14	Rig Up: HPU	Desmonstrate the ability to rig up the HPU system.											0	
25 DL 15	Rig Up: Energize Draw Works & Driller Control	Demonstrate ability to function test the Draw Works operations and emergency shut												
	0.0	down.											0	
DL 15	Rig Up: Energize Draw Works & Driller Control	Explain Draw Works & Drillers Console energizing procedures & requirements.		1									0	
26 DL 16	Rig Up: Pipe Handler Equipment	Demonstrate ability to correctly connect all hydraulic lines.											0	
		Explain the process for assembling derrick/mast, raising structure & equipment.											0	
27 DL 17	Rig Up: Derrick/Mast Assembly	Demonstrate the ability to perform the Pre-Raise Mast/Derrick Inspection.		1									0	
		Demonstrate the ability to raise and secure Mast/Derrick to Rig Floor.											0	
	(	Demostrate the ability to string up lines & blocks in the mast/derrick.		1									0	
		Desmonstrate the process for assembling derrick/mast, raising structure & equipment.											0	
		Ensure derrick ladders are in proper position & stand pipe connected.											0	
		Explain how to raise and secure Mast/Derrick to Rig Floor.											0	
		Explain the Pre-Raise Mast/Derrick Inspection.											0	
28 DL 18	Rig Up: Rig Floor	Demonstrate the ability to install & rig up winches and air tuggers.											0	
		Explain how to install & rig up winches and air tuggers.											0	
29 DL 20	Rig Up: Mud Tanks	Demonstrate the ability to Fill Mud Tanks, Check & Repair Leaks & Function Test All											0	
		Associated Equipment.											U	
		Demonstrate the ability to install flow line & associated equipment.											0	
		Demonstrate the ability to install mud mix equipment.											0	
		Demonstrate the ability to install solids/gas control equipment.											0	
30 DL 22	Rig Up: Drill Water Systems	Demonstrate the ability to Install Trip TanK & Associated Equipment & lines.		1									0	
DL 22	Rig Up: Drill Water Systems	Demonstrate the ability to set Reserve Water Tanks, Rig Water Tanks, Check & Repair		-									0	
		Leaks.											0	
DL 22	Rig Up: Well Control Equipment	Demonstrate the ability to position choke manifold/gas seperator.		1									0	
31 DL 23	Prepare for Rig Down: Preparation	Explain what can be prepared for move prior to rig release.											0	
32 DL 24	Prepare for Rig Down: Inspection	Explain pre-move inspection/check list.											0	
33 DL 25	Prepare for Rig Down: Workplan	Explain pre-move JSA/Work Plan, including 3rd party involvement.											0	
34 DL 26	Prepare for Rig Down: Crew Deployment	Explain supervision/crew deployment for rig down.											0	
35 DL 27	Rig Down: Critical Steps	Demonstrate ability to ensure all equipment has been removed from location.											0	
	ů i	Demonstrate ability to ensure BOP and associated equipment is nippled down and loaded		1									-	
		out.											0	
		Demonstrate ability to ensure only approved and certified lifting equipment is used.											0	
		Demonstrate ability to lower and prepare mast for transport.		1									0	
		Demonstrate ability to shut down power for ancillary equipment.		1	1								0	
		Explain ability to ensure correct order for shut down of ancillary equipment.		1									0	
		Explain critical steps for rig down and move.		1									0	
		Explain JSA / Work Plan knowledge for each critical step.											0	
		Explain load out procedure / order of equipment to be moved.		1									0	
	(	Explain Repair & Maintenance plan (if applicable).											0	
	(	Explain required coordination between rig crew, supervisor, move crew, and 3rd party												
		vendor.											0	
36 DL 28	Rig Down: Fall Protection	Demonstrate ability to ensure anchor points are identified for crew lanyards.			1								0	
		Explain pin removal and associated hazards.		1	Γ								0	
	(	Explain procedures for working around the cellar/well head.		1									0	
37 DL 29	Rig Down: Inspection Process	Explain inspection process for drill line.											0	
		Explain pre-move inspection process for ancillary equipment.		1									0	

#### Annex-13 : Competency Table: – Toolpusher 4/20

Position:		Toolpusher			Compete	ency level	required			Profic	ciency S	icale		GAP	Individu	al Develo	pment Pl	an
					Re	quired Sco	ore			Act	ual Sco	re				_		
No Code	No	Functional competency	Description of competency	Awareness	Application	Career	Advanced	Expert	Awarene	Applicati	Career	Advance	Expert					
		,, ,, ,, ,, ,		1	2	Proficient	Level	Level	SS	on l	Proficien	d Level	Level					
38 DL	30	Rig Down: Transportation	<ul> <li>Demonstrate ability to ensure drill line is prepared for travel.</li> </ul>							L				0				
			<ul> <li>Demonstrate ability to separate and load out substructure.</li> </ul>											0				
			<ul> <li>Explain how to secure all lines, piping and physical objects to prevent hazards during</li> </ul>											0				
			transporting.											-			$\vdash$	
			Explain mat cleaning requirement prior to load out.											0			—	
39 DL	31	Rig Down: Environmental	Explain drilling fluid capture and transfer process.											0				
10			<ul> <li>Explain, if applicable, the process for oil-based mud (UBM) rig clean up and containment.</li> </ul>											0			+	
40			<ul> <li>Demonstrate ability to complete a stack out inventory list.</li> <li>Demonstrate ability to accuracity accurate and started in an appropriate location and</li> </ul>			+												
			<ul> <li>Demonstrate ability to ensure ng components are stored in an appropriate location and secured</li> </ul>											0				
			<ul> <li>Explain procedure for ensuring power equipment is prepared for storage.</li> </ul>			1	1							0			1	
			<ul> <li>Explain the procedure to ensure rig components are stored in an appropriate location and</li> </ul>			1	1			i1							1	
			secured.											0				
41 DL	33	Vertical/Conventional Drilling: Rig Math, Well	<ul> <li>Demonstrate how to measure, strap, &amp; caliper all tubulars.</li> </ul>											0				
		Head and BOP Control Equipment												0				
			<ul> <li>Demonstrate how to check drilling fluids characteristics and measurement.</li> </ul>							L				0				
			<ul> <li>Demonstrate how to measure from Rotary Kelly Bushings to Well Head/Rotary Kelly</li> </ul>											0				
			Bushings to all Blowout Preventor Rams and Annular.				ļ										L	
			Demonstrate how to perform math calculations on pressure & volume.				ļ	ļ						0				
42	-		<ul> <li>Explain the rig components and their limitations.</li> </ul>											0		—	+	
42 DL	34	Vertical/Conventional Drilling: Drawworks &	<ul> <li>Demonstrate now to operate drawworks and associated components.</li> </ul>											0				
		Associated Equipment	Evaluin the function of drawworks and all associated components (crown saving devices															
			brake systems & coolant lines, guards, chains, sprockets, gear hoxes, shut downs											0				
			hoisting/lowering limits ner rig design)											Ū				
43 DL	35	Vertical/Conventional Drilling: Automated	Demonstrate how to ensure that moving equipment does not interfere with other			1	1											
-		Pipe Handling	equipment/machinery - Simulataneous Operations.											0				
			<ul> <li>Explain the importance of checking the equipment prior to use.</li> </ul>			1	1							0				
44 DL	36	Vertical/Conventional Drilling: Execution Of	<ul> <li>Demonstrate how to follow the client's daily drilling plans.</li> </ul>				1							0				
		Drilling And Well Operations												0				
			<ul> <li>Demonstrate how to maintain an accurate pipe tally in relation to the well design.</li> </ul>											0				
			<ul> <li>Demonstrate how to make trips.</li> </ul>			4	ļ							0			ļļ	
			Demonstrate how to complete the daily tour sheet.			ļ	ļ							0			$\vdash$	
45 DL	37	Vertical/Conventional Drilling:	<ul> <li>Demonstrate how to ream at the correct RPM and GPM.</li> </ul>											0				
		Drilling/Reaming																
			<ul> <li>Explain the importance to maintain complete records of all tools and tubular run into the bale (including, made up longths, tool joints OD, ID, Social numbers).</li> </ul>											0				
46 DI	39	Vertical/Conventional Drilling: Pine	Demonstrate correct measuring points on all tubular, casings and tools														$\vdash$	
40 00	55	measurement number and stranning of nines	Demonstrate correct measuring points on an cubular, casings and cools.											0				
		incusarement, number and scrapping of pipes	<ul> <li>Explain how to correctly read a strapping tape.</li> </ul>			+	1							0				
			Explain how to properly number stands in derrick when TIH or POOH.											0			1	
47 DL	40	Vertical/Conventional Drilling: Stuck Pipe	<ul> <li>Demonstrate how to determine the drill string operating limits.</li> </ul>			1	1											
		Operation												0				
48 DL	41	Vertical/Conventional Drilling: Downhole	<ul> <li>Explain downhole problems and potential equipment failures.</li> </ul>											0				
		problems and equipment failure					<u>,</u>			,				U	<u> </u>		<u>,                                    </u>	
49 DL	42	Vertical/Conventional Drilling: Standpipe and	<ul> <li>Demonstrate how to ensure all valves are in the "full open" or "closed" position.</li> </ul>				1							0				
		Bleed Off Line					ļ	ļ						, , , , , , , , , , , , , , , , , , ,			╘─────	
50 DL	44	Vertical/Conventional Drilling: Tripping	<ul> <li>Demonstrate how to correctly monitor and record mud return and fill volumes while</li> </ul>						11					0				
			tripping in/out to recognize warning signs for well control issues.														<u> </u>  -	
			<ul> <li>Explain efficient tripping speeds in open hole and when bit/ stab go through BOPs.</li> </ul>					ļ						0				
			<ul> <li>Explain now to monitor and record mud return and fill volumes while tripping in/out to according to the second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second sec</li></ul>				1							0				
			recognize warning signs for Well control issues.			1	1											

#### Annex-13 : Competency Table: – Toolpusher 5/20

Position: Toolpusher			Compete	ency level	required			Prof	iciency S	Scale	GAP	Ir	ndividual	Develo	pment I	Plan
			Re	quired Sco	ore			Ac	tual Sco	re			_	_	_	
No Code No Functional competency	Description of competency	Awareness	Application	n Career	Advanced	Expert	Awarene	Applicati	Career	Advance Exp	rt	-				
		1	2	Proficient	Level	Level	SS	on	Proficien	d Level Lev	1			<b></b>	<u> </u>	
51 DL 45 Vertical/Conventional Drilling: Drilling Program	Explain how to plan and carry out all aspects of the client's well program.										0					
52 DL 47 Vertical/Conventional Drilling: Picking u drilling assembly	Demonstrate the ability to caliper and measure the BHA.										0					
	<ul> <li>Demonstrate the method for strapping and counting the drill pipe.</li> </ul>										0					
	<ul> <li>Explain the importance and how to caliper and measure the BHA.</li> </ul>										0		_			
	<ul> <li>Explain the method for strapping and counting the drill pipe.</li> </ul>						_				0					
53 DL 48 Vertical/Conventional Drilling: Trip in ho (TIH)	Explain fluid displacement when TIH.										0					
	<ul> <li>Explain kick identification while TIH.</li> </ul>									ļ	0				ļļ.	
	<ul> <li>Explain the importance of recognizing bridging conditions.</li> </ul>				ļ						0				ļļ.	
	<ul> <li>Explain the importance of surge/swab hole conditions.</li> </ul>										0					
	Explain the procedure if a kick is detected during TIH.										0		—	+	$\vdash$	
54 DL 49 Vertical/Conventional Drilling: Trip out c (TOH)	hole • Explain displacement as drilling assembly is pulled out of hole.										0					
	<ul> <li>Explain kick identification while TOH.</li> </ul>										0		_			
	Explain procedure if a kick is detected during TOH.										0		<u> </u>		$\vdash$	
55 DL 50 Vertical/Conventional Drilling: Underbal	nced • Demostrate how to maintain equivalent circulating density (ECD) during underbalanced										0					
Drilling	drilling.															
	Explain additional instrumentation used during underbalanced drilling.     Explain bit volumes and flow characteristics		+	+											++	
	Explain pit volumes and now characteristics.      Explain the use of rotating control device (BCD)			+												
	Explain the use of rotating control device (red):     Explain the well control procedures and process during underbalanced drilling.			+											++	
56 DI 51 Well Control: Riser/Diverter/ BOP (Run a	Demonstrate how to install new wellhead gaskets.			1										+	+	
Retrieve)	• • • • • • • • • • • • • • • • • • • •										0					
	<ul> <li>Explain how to identify ring gaskets in relation to BOP flanges.</li> </ul>			1					(*************************************		0			1	1	
	<ul> <li>Explain how to install new wellhead gaskets.</li> </ul>										0					
	<ul> <li>Explain the different phases of nippling up BOP and diverter based on hole section.</li> </ul>										0					
57 DL 52 Well Control: Diverting	<ul> <li>Explain how to pump either kill mud or water.</li> </ul>										0				ļļ.	
	<ul> <li>Explain the importance of operating the diverter.</li> </ul>										0				$\square$	
58 DL 53 Well Control: Management Well Contro Systems	Demonstrate function test of the BOP.										0					
	<ul> <li>Explain BOP components, their functions and their limitations.</li> </ul>				ļ						0			_		
	Explain the normal line up of BOP valves, Hydraulic chokes, Choke manifold and degasser										0					
	in accordance to the well program.				<u> </u>								<u> </u>	<u> </u>	┿	
59 DL 54 Well Control: Well Integrity And Well Co	trol • Demonstrate how to take SPR's, complete kill sheet and take accurate and correct SIDPP										0					
	and SICP gauge reduings.												—	+	$\vdash$	
	Complete kin sheet and take accurate and confect SIDFF and										0					
	<ul> <li>Explain the different methods for shutting the well and the killing procedures.</li> </ul>										0			-		
	<ul> <li>Explain the direction includes for shareing the view and the taning proceedings?</li> <li>Explain how to recognize influx and shut in well.</li> </ul>			1							0					
60 DL 55 Unconventional Drilling: Air Drilling	<ul> <li>Explain instrumentation used during air drilling.</li> </ul>										0		_			
	Explain rig up of low pressure air system into high pressure mud system.		1								0	-				
	Explain the differences between mud drilling and air drilling.										0					
	Explain the function of blooie line and how to secure.							ļ			0				ļT	
	Explain the importance of an igniter at the end of a blooie line.								i		0				<b> </b>	
	Explain the pressure differential between input air and return air.				<u> </u>						0				$\vdash$	
	<ul> <li>Explain the use of rotating control device (RCD).</li> </ul>				<u> </u>		L	ļ			0	┥┝—	<u> </u>		$\vdash$	
61 DL 56 Unconventional Drilling: Coring	<ul> <li>Explain pick up and lay down procedures of the core barrel.</li> </ul>				ļ			ļ	ļ						┿	
	<ul> <li>Explain the differences between conventional coring and sidewall coring.</li> <li>Evaluate the basards when retriguing cores</li> </ul>		+		ļ						0	+			++	
	Explain the relationship of the outer and inner barrels for coring		+								0			+	++	

#### Annex-13 : Competency Table: – Toolpusher 6/20

Position: T	Toolpusher			Compete	ency level	required			Pro	ficiency S	cale		GAP	Indivi	dual Dev	velopment Plan
				Re	auired Sc	ore			A	ctual Sco	re				_	_
No Code No F	unctional competency	Description of competency	Awareness	Application	Career	Advanced	Expert	Awarene	Applicat	ti Career	Advance	Expert				
	,		1	2	Proficient	Level	Level	ss	on	Proficien	d Level	Level				
62 DL 57 D	Pirectional Drilling: Mechanical Survey Tools	<ul> <li>Explain the application for Teledrift type drift indicators.</li> </ul>											0			
		<ul> <li>Explain the application for Totco type drift indicators.</li> </ul>											0			
63 DL 58 D	Directional Drilling: Magnetic Survey Tools	<ul> <li>Explain the application for Multi-shot film.</li> </ul>							ļ				0			
DL 58 D	Directional Drilling: Magnetic Survey Tools	<ul> <li>Explain the application for Single shot film.</li> </ul>							ļ				0			
64 DL 59 D	Directional Drilling: Gyroscopic Survey Tools	• Explain how information travels from the MWD to the surface to the computer system.											0			
		<ul> <li>Explain the application for Electronic single and multi-shot instruments.</li> </ul>											0			
		Explain the application for Magnetic and gyroscopic MWD surveys.			+								0			
		Explain the application for Null-shot.											0			
		Explain the application for single shot.								++			0			
		Explain the purpose and positioning of Non-magnetic drill collars and the BHA.			1								0			
65 DL 60 D	Pirectional Drilling: Wellbore Surveying and	Demonstrate ability to solve problems associated with running a survey.														
R	ecord Keeping												0			
		<ul> <li>Demonstrate application of the above.</li> </ul>											0			
		Demonstrate how to run a survey.											0			
		<ul> <li>Differentiate when survey data may be considered valid or invalid.</li> </ul>											0			
		<ul> <li>Explain general practices to take to prevent survey data discrepencies.</li> </ul>											0			
		<ul> <li>Explain problems associated with survey data.</li> </ul>			ļ				ļ				0			
		<ul> <li>Explain the application for elements of a directional survey.</li> </ul>			ļ				ļ				0			
		<ul> <li>Explain the concepts dogleg and how dogleg severity affects the wellbore.</li> </ul>											0			
66 DL 61 D	Directional Drilling: Directional Plots and	<ul> <li>Drilling Parameters &amp; Directional Drilling: Explain hydraulics with and without downhole</li> </ul>											0			
D	onling Parameters	Motors.														
		motors											0			
		<ul> <li>Drilling Parameters &amp; Directional Drilling: Explain rotary speed limitations</li> </ul>								+ +			0		+	
		Drilling Parameters & Directional Drilling: Explain rotal y speed immediates:     Drilling Parameters & Directional Drilling: Explain solids control and oil-based mud (OBM)			+											
		considerations.											0			
		<ul> <li>Drilling Parameters &amp; Directional Drilling: Explain weight on bit (WOB) considerations.</li> </ul>											0			
		<ul> <li>Elements of the Directional Plot: Explain the intent/importance of plot details.</li> </ul>											0			
		<ul> <li>Elements of the Directional Plot: Explain the plan view.</li> </ul>											0			
		<ul> <li>Elements of the Directional Plot: Explain vertical section view.</li> </ul>		ļ					L				0			
		<ul> <li>Elements of the Directional Plot: Explain wellpath and site legend details.</li> </ul>											0			
67 DL 62 D	Directional Drilling: Motor Theory and	<ul> <li>Explain chemical and fluid slide enhancement.</li> </ul>											0			
0	operations															
		Explain factors affecting sliceability.     Explain how a PDM (positive displacement motor) works and major mechanical											U			
		assemblies											0			
		<ul> <li>Explain micro doglegs and ledging when drilling with motors.</li> </ul>											0			
		<ul> <li>Explain motor operating procedures and parameters.</li> </ul>											0			
		<ul> <li>Explain reactive torque such as hole conditions and drill string design.</li> </ul>											0			
		<ul> <li>Explain stabilizer use and effect on build rates.</li> </ul>											0			
		<ul> <li>Identify &amp; Explain bearing and housing types.</li> </ul>											0			
68 DL 63 D	irectional Drilling: Hole Cleaning and	Explain clean up cycles.									T		0			
Ci	uttings Transport in Horizontal Wells				<u> </u>											
		Explain neucal cuttings path hole cleaning model in horizontal wells.			+								U 0			
60 DI 66 H	loisting /Pig Eloor: Derrick Climbing Systems	Explain Los (low gravity solids) and solids control considerations.						$\vdash$					U		<u> </u>	
09 DL 00 H	ioisting/nig rioof. Derrick climbing systems	<ul> <li>Demonstrate now to use equipment associated with personner climbing systems (ng specific)</li> </ul>											0			
		Explain how to inspect equipment associated with personnel climbing systems								+			0			
70 DI 70 H	loisting/Rig Floor: Manriding Winches & Belts	Demonstrate correct hand signals associated with operating manriding winch			-						+		0		-+	
	,	Demonstrate how to inspect manriding winch.			1				t				0			
		<ul> <li>Demonstrate how to inspect, wear &amp; fasten manriding belt.</li> </ul>		İ	1		1		1	1			0			

#### Annex-13 : Competency Table: – Toolpusher 7/20

N         Code No         Functional competency         Description of competency         No         Code No         Functional competency         No         Code No         Functional competency         No         Code No         Particle Structure         No         Code No         Functional competency         Code No         Functional competency         Functional competency <th< th=""><th></th></th<>	
No         Code No         Functional competency         Description of competency         No         Code No         Functional competency         No         No         Code No         Functional competency         No         No         No         Code No         Functional competency         Demonstrate number of aginal associated with operating utility winch.         Period         Level         Level         Level         No         Code No         Period         Level         Level         No         Period         Level         Level         No         Period         Level         Level         No         Period         Level         Level         No         Period         Level         Level         No         Period         Level         No         Period         Level         No	
1       2       Profice       Level       ss       on       Profice       devel       devel       test       on       Profice       devel       devel       devel       test       on       Profice       devel	
71       Noting/Rig Floor: Utility Winches       Demonstrate correct hand signals associated with operating utility winch.       Image: Constraint of the purpose of constraint operating utility winch.       Image: Constraint operating utility winch.       Image: Constraint operating utility winch.       Image: Constraint operating utility winch.       Image: Constraint operating utility winch.       Image: Constraint operating utility winch.       Image: Constraint operating utility winch.       Image: Constraint operating utility winch.       Image: Constraint operating utility winch.       Image: Constraint operating utility winch.       Image: Constraint operating utility winch.       Image: Constraint operating utility winch.       Image: Constraint operating utility winch.       Image: Constraint operating utility winch.       Image: Constraint operating utility winch.       Image: Constraint operating utility winch.       Image: Constraint operating utility winch.       Image: Constraint operating utility winch.       Image: Constraint operating utility winch.       Image: Constraint operating utility winch.       Image: Constraint operating utility winch.       Image: Constraint operating utility winch.       Image: Constraint operating utility winch.       Image: Constraint operating utility winch.       Image: Constraint operating utility winch.       Image: Constraint operating utility winch.       Image: Constraint operating utility winch.       Image: Constraint operating utility winch.       Image: Constraint operating utility winch.       Image: Constraint operating utility winch.       Image: Constraint operating utility winch.       Image: Constraint operating util	
72 DL       72 Power Systems: Engine instrumentation       Explain the purpose of engine instrumentation.       Image: Construct Not Not Safely operate and maintain Ulity winch.       Image: Construct Not Not Safely operate and maintain Ulity winch.       Image: Construct Not Not Safely operate and maintain Ulity winch.       Image: Construct Not Not Safely operate and maintain Ulity winch.       Image: Construct Not Not Safely operate and maintain Ulity winch.       Image: Construct Not Not Safely operate And Not Not Safely operate And Not Not Not Not Not Not Not Not Not Not	
72       Power Systems: Engine instrumentation       Explain the purpose of engine instrumentation.       0       0         73       DL       73       Power Systems: Engine report and log book       0       0       0         74       DL       74       Power Systems: Engine fluids       0       0       0       0         74       DL       74       Power Systems: Engine fluids       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0 <td></td>	
73       Power Systems: Engine report and log book       Demostrate how to record engine gauge readings and maintain logs.       0       0         74       DL       74       Power Systems: Engine fluids       Demostrate how to check engine fluids and level requirements.       0       0       0         75       DL       75       Power Systems: Engine fluid system       Demonstrate how to ensure pressure, filtration and line requirements.       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0	
74       DL       74       Power Systems: Engine fluids       Demonstrate how to check engines fluids levels and add as required. Explain types of engine fluids and level requirements.       Image: Constraint the purpose of record to the purpose of record to the purpose of record to the purpose of record to the purpose of record to the purpose of record to the purpose of record to the purpose of record to the purpose of record to the purpose of record to the purpose of record to the purpose of record to the purpose of record to the purpose of record to the purpose of record to the purpose of record to the purpose of record to the purpose of record to the purpose of record to the purpose of record to the purpose of record to the purpose of record to the purpose of record to the purpose of record to the purpose of record to the purpose of record to the purpose of record to the purpose of record to the purpose of record to the purpose of record to the purpose of record to the purpose of record to the purpose of record to the purpose of record to the purpose of record to the purpose of record to the purpose of record to the purpose of record to the purpose of record to the purpose of record to the purpose of record to the purpose of record to the purpose of record to the purpose of record to the purpose of record to the purpose of record to the purpose of record to the purpose of record to the purpose of record to the purpose of record to the purpose of record to the purpose of record to the purpose of record to the purpose of record to the purpose of record to the purpose of record to the purpose of record to the purpose of record to the purpose of record to the purpose of record to the purpose of record to the purpose of record to the purpose of record to the purpose of record to the purpose of record to the purpose of record to the purpose of record to the purpose of record to the purpose of record to the purpose of record to the purpose	
74       DL       74       Power Systems: Engine fluids       0       0       0         75       DL       75       Power Systems: Engine fuel system       0       0       0       0         75       DL       76       Power Systems: Engine fuel system       0       0       0       0       0         76       DL       76       Power Systems: Engine air intake system       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0 <t< td=""><td></td></t<>	
75       DL       75       Power Systems: Engine fuel system <ul> <li>Demonstrate how to ensure pressure, filtation and line requirements will sustain engine operation.</li> <li>Explain pressures, filtation, and line requirements will sustain engine operation.</li> <li>Explain pressures, filtation, and line requirements will sustain engine operation.</li> <li>Explain pressures, filtation, and line requirements will sustain engine operation.</li> <li>Explain pressures, filtation, and line requirements will sustain engine operation.</li> <li>Explain pressures, filtation, and line requirements will sustain engine operation.</li> <li>Explain pressures, filtation, and line requirements will sustain engine operation.</li> <li>Explain how to change air filters.</li> <li>Explain how to to tonge air filters.</li> <li>Explain how to inspect air filters and inske differential pressures.</li> <li>Explain how to inspect air filters and inske differential pressures.</li> <li>Explain how to change out expendables.</li> <li>Explain how to change out expendables.</li> <li>Demonstrate how to change out expendables.</li> <li>Demonstrate how to induce dup expendables.</li> <li>Demonstrate how to induce the values.</li> <li>Demonstrate how to induce upendables.</li> <li>Demonstrate how to induce the values.</li> <li>Demonstrate how to induce the values.</li> <li>Demonstrate how to induce the values.</li> <li>Demonstrate how to induce multiplication operating.</li> <li>Explain how to change out expendables.</li> <li>Demonstrate how to induce multiplication operating.</li> <li>Explain how to change out expendables.</li> <li>Demonstrate how to induce multiplic</li></ul>	
73       DL       73       DL       73       DL       74       Demostrate flow of charge pressure, filtration, and line inspection.       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0 </td <td></td>	
76       DL       76       Power Systems: Engine cooling system       Explain pressures, filtration, and line inspection.       0       0       0         77       DL       77       Power Systems: Engine air intake systems       Demonstrate now to change air filters and intake differential pressures.       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0	
76       DL       76       Power Systems: Engine cooling system       Explain how to check engine cooling level.       0       0       0         77       DL       77       Power Systems: Engine air intake systems       0       Demonstrate how to change air filters.       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0<	
77       DL       77       Power Systems: Engine air intake systems          • Explain radiator and cooling fan inspection.         • Demonstrate how to change air filters.         • Explain how to inspect air filters and intake differential pressures.         • Explain how to inspect air filters and intake differential pressures.         • Explain how to inspect air filters and mix chemicals in each pit.         • System         • Circulating Systems: High Pressure Mud         System         • Explain the layout of the pits including valve locations.         • Explain how to change out expendables.         • Demonstrate how to isolate the valves.         • Demonstrate how to induge out expendables.	
77       DL       77       Power Systems: Engine air intake systems <ul> <li>Demonstrate how to change air filters.</li> <li>Explain how to inspect air filters and intake differential pressures.</li> <li>Explain how to inspect air filters and intake differential pressures.</li> <li>Explain how to inspect air filters and intake differential pressures.</li> <li>Explain how to inspect air filters and intake differential pressures.</li> <li>Demonstrate value alignment to transfer mud and mix chemicals in each pit.</li> <li>Explain the layout of the pits including value locations.</li> <li>Demonstrate how to change out expendables.</li> <li>Demonstrate how to isolate the values.</li> <li>Demonstrate how to isolate the values.</li> <li>Demonstrate how to indig operating.</li> <li>Explain how to change out expendables.</li> <li>Explain how to change out expendables.</li> <li>Demonstrate how to change out expendables.</li> <li>Demonstrate how to change out expendables.</li> <li>Demonstrate how to change out expendables.</li> <li>Demonstrate how to change out expendables.</li> <li>Demonstrate how to change out expendables.</li> <li>Demonstrate how to change out expendables.</li> <li>Demonstrate how to change out expendables.</li> <li>Demonstrate how to change out expendables.</li> <li>Demonstrate how to change out expendables.</li> <li>Demonstrate how to change out expendables.</li> <li>Demonstrate how to change out expendables.</li> <li>Demonstrate how to change out expendables.</li> <li>Demonstrate how to change out expendables.</li> <li>Demonstrate how to change out expendables.</li> <li>Demonstrate how to</li></ul>	
Vert Net Net Net Net Net Net Net Net Net Ne	
78       DL       78       Circulating Systems: Low Pressure Mud System <ul> <li>Demonstrate value alignment to transfer mud and mix chemicals in each pit.</li> <li>Explain the layout of the pits including value locations.</li> <li>Demonstrate how to change out expendables.</li> <li>Demonstrate how to hom to mult</li></ul>	
System     Explain the layout of the pits including value locations.     O     O     O       79     DL     79     Circulating Systems: High Pressure Mud System     Demonstrate how to change out expendables.     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O <td></td>	
Y       P       Explain the layout of the pits including value locations.       Image: Constraint of the pits including value locations.       Image: Constraint of the pits including value locations.       Image: Constraint of the pits including value locations.       Image: Constraint of the pits including value locations.       Image: Constraint of the pits including value locations.       Image: Constraint of the pits including value locations.       Image: Constraint of the pits including value locations.       Image: Constraint of the pits including value locations.       Image: Constraint of the pits including value locations.       Image: Constraint of the pits including value locations.       Image: Constraint of the pits including value locations.       Image: Constraint of the pits including value locations.       Image: Constraint of the pits including value locations.       Image: Constraint of the pits including value locations.       Image: Constraint of the pits including value locations.       Image: Constraint of the pits including value locations.       Image: Constraint of the pits including value locations.       Image: Constraint of the pits including value locations.       Image: Constraint of the pits including value locations.       Image: Constraint of the pits including value locations.       Image: Constraint of the pits including value locations.       Image: Constraint of the pits including value locations.       Image: Constraint of the pits including value locations.       Image: Constraint of the pits including value locations.       Image: Constraint of the pits including value locations.       Image: Constraint of the pits including value locations.       Image: Constraint of the pits includ	
79     DL     79     Circulating Systems: High Pressure Mud System        • Demonstrate how to change out expendables.       • Demonstrate how to isolate the values.       • Demonstrate how to monitor mud pumps during operating.       • Explain how to change out expendables.       • Explain how to change out expendables.       • Demonstrate how to change out expendables.       • Demonstrate how to change out expendables.       • Demonstrate how to change out expendables.       • Demonstrate how to change out expendables.       • Demonstrate how to change out expendables.       • Demonstrate how to change out expendables.       • Demonstrate how to change out expendables.       • Demonstrate how to change out expendables.       • Demonstrate how to change out expendables.       • Demonstrate how to change out expendables.       • Demonstrate how to change out expendables.       • Demonstrate how to change out expendables.       • Demonstrate how to change out expendables.       • Demonstrate how to change out expendables.       • Demonstrate how to change out expendables.       • Demonstrate how to change out expendables.       • Demonstrate how to change out expendables.       • Demonstrate how to change out expendables.       • Demonstrate how to change out expendables.       • Demonstrate how to change out expendables.       • Demonstrate how to change out expendables.       • Demonstrate how to change out expendables.       • Demonstrate how to change out expendables.       • Demonstrate how to change out expendables.       • Demonstrate how to change out expendables.       • Demonstrate how to change out expendables.       • Demonstrate how to change out expendables.       • Demonstrate how to change out expendables.       • Demonstrate how to change out expendables.       • Demonstrate how to change out expendables.       • Demonstrate how to change out expendables.       • Demonstrate how to change out expendables.       • Demonstrate how to change	
System <ul> <li>Demonstrate how to isolate the values.</li> <li>Demonstrate how to monitor mud pumps during operating.</li> <li>Explain how to change out expendables.</li> <li>Demonstrate how to change out expendables.</li> <li>Demonstrate how to change out expendables.</li> <li>Demonstrate how to change out expendables.</li> <li>Demonstrate how to change out expendables.</li> <li>Demonstrate how to change out expendables.</li> <li>Demonstrate how to change out expendables.</li> <li>Demonstrate how to change out expendables.</li> <li>Demonstrate how to change out expendables.</li> <li>Demonstrate how to change out expendables.</li> <li>Demonstrate how to change out expendables.</li> <li>Demonstrate how to change out expendables.</li> <li>Demonstrate how to change out expendables.</li> <li>Demonstrate how to change out expendables.</li> <li>Demonstrate how to change out expendables.</li> <li>Demonstrate how to change out expendables.</li> <li>Demonstrate how to change out expendables.</li> <li>Demonstrate how to change out expendables.</li> <li>Demonstrate how to change out expendables.</li> <li>Demonstrate how to change out expendables.</li> <li>Demonstrate how to change out expendables.</li> <li>Demonstrate how to change out expendables.</li> <li>Demonstrate how to change out expendables.</li> <li>Demonstrate how to change out expendables.</li> <li>Demonstrate how to change out expendables.</li> <li>Demonstrate how to change out expendables.</li> <li>Demonstrate how to change out expendables.</li> <li>Demonstrate how to change out expendables.</li> <li>Demonstrate how to change out expendables.</li> <li>Demonstrate how to change out expendables.</li> <li>Demonstrate how to change out expendables.</li> <li>D</li></ul>	
Demonstrate how to solate the Valves.     Demonstrate how to monitor mud pumps during operating.     Explain how to change out expendables.	
Explain how to change out expendables.	
Capital now to change out expendations.	
Evaluate the nurranse and operation of much numps	
Copening the particular operation of the particular operations of the particular operation of the particular operation of the particular operation of the particular operation of the particular operation of the particular operation of the particular operation of the particular operation of the particular operation of the particular operation of the particular operation operation of the particular operation operation operation operation operation operation operation operation operation operation operation operation operation operation operation operation operation operation operation operation operation operation operation operation operation operation operation operation operation operation operation operation operation operation operation operation operation operation operation operation operation operation operation operation operation operation operation operation operation operation operation operation operation operation operation operation operation operation operation operation operation operation operation operation operation operation operation operation operation operation operation operation operation operation operation operation operation operation operation operation operation operation operation operation operation operation operation operation operation operation operation operation operation operation operation operation operation operation operation operation operation operation operation operation operation operation operation operation operation operation operation operation operation operation operation operation operation operation operation operation operation operation operation operation operation operation operation operation operation operation operation operation operation operation operation operation operation operation operation operation operat	
80 DL 80 Circulating Systems: Pulsation Demonstrate how to perform maintenance of a pulsation dampener.	
Dampener/Bladder	
Explain the operation and maintenance of a pulsation dampener.	
Explain the purpose of a pulsation dampener.	
81 DL   81 Circulating Systems: Shale shakers   Demnostrate shale shaker maintenance.	
Demonstrate how to adjust shaker screens.	
Demonstrate how to change shaker screens.     Demonstrate how to change shaker screens.	
Explain how to adjust shaker screens.	
Explain how to change snaker screens.	
CApiani Side Side Characterization     Capitali Side Side Characterization	
2 DI 82 Circulating Sustame: Trin Tank: Demonstrate house in trin tank values for filling or monitoring the hole	
C C C C C C C C C C C C C C C C C C C	
Explain the purpose of the trip tank.	
83 DL 83 Circulating Systems: Mud Saver Bucket • Demonstrate how to perform maintenance on the mud saver bucket.	
Demonstrate how to use the mud saver bucket.	
Explain the purpose of a mud saver bucket.	
Explain when to use the mud saver bucket.	
84   DL   84   Rotating System: Master Bushings   Demonstrate how to identify wear of the master bushings.	
Demonstrate how to perform maintenance of the master bushings.	
Demonstrate how to pull and set master bushings.	
Explain how to identify wear of the master bushings.	
Explain how to perform maintenance of the master pushings.	
CApient the purpose of use indicate outsings.     Capient the purpose of use indicate outsings.     Demonstrate the maintenance more first for the rotary table	
Consistence of the procedures for the roady cause.	
Controlstate the procedure for the rata table.	
Explain the procedure for locking around.	
Explain the purpose of the rotary table.	
# Annex-13 : Competency Table: – Toolpusher 8/20

Position:		Toolpusher			Compete	ency level	required			Profi	iciency S	Scale		GAP	Individual Development Plan
					Re	quired Sco	ore			Act	tual Sco	re			
No Code	No _	Functional competency	Description of competency	Awareness	Application	Career	Advanced	Expert	Awarene	Applicati	Career	Advance	Expert		
				1	2	Proficient	Level	Level	SS	on	Proficien	d Level	Level		
86 DL	86	Well Control Equipment: BOP Handling	<ul> <li>Demonstrate proper sling application and attachment methods between lifting device and</li> </ul>											0	
		Systems	BOP equipment.											0	
			<ul> <li>Explain JSA / Work Plan knowledge for each critical step.</li> </ul>											0	
			<ul> <li>Explain proper application and use of BOP handling systems.</li> </ul>											0	
87 DL	87	Well Control Equipment: BOP Control System	Demonstrate how to connect the HCR valve, manual valve, coflex hose, for BOP and choke											0	
		And Accumulator	manifold.											0	
			<ul> <li>Demonstrate how to connect the kill line and check valve as designed.</li> </ul>											0	
			<ul> <li>Demonstrate how to function test all BOP elements.</li> </ul>											0	
			Demonstrate how to indentify that BOPE hydraulic lines meet OEM requirements and are											0	
			connected and protected to ensure BOPE function as designed.											0	
			<ul> <li>Demonstrate how to install the Driller's and remote BOP control panels and function test</li> </ul>											0	
			same.												
			Demonstrate that all valves and gauges are in good working condition and clearly marked											0	
			as to their function.											v	
			Demonstrate that resevoir is filled to proper fluid level with proper fluid.											0	
			Demonstrate that the accumulator unit has the proper fluid volume capacity for the BOP											0	
			application to which it is being connected.												
			<ul> <li>Demonstrate that the BOP Control system and accumulator unit has the proper working</li> </ul>											0	
			pressure rating for the BOP equipment to be installed.												
			Explain accumulator unit fluid volume capacity as related to the BOP equipment to be											0	
			installed.											-	
			<ul> <li>Explain BOP Control system and accumulator unit working pressure rating as related to</li> </ul>											0	
			the BOP equipment to be installed.			ļ								Ŭ	
			Explain how to connect the HCR valve, manual valve, coflex hose, for BOP and choke											0	
			manifold.			ļ								-	
			<ul> <li>Explain how to function test all BOP elements.</li> </ul>											0	
			• Explain how to install the Driller's and remote BOP control panels and function test same.											0	
			<ul> <li>Explain the designed arrangement foor kill line and check valve.</li> </ul>			ļ								0	
			Explain the importance of the condition of valves and gauges and their identification.											0	
			Explain the requirements for BOPE hydraulic lines.											0	
88 DL	88	Well Control Equipment: BOP Preventers &	<ul> <li>Demonstrate how to install new ring and wellhead gaskets.</li> </ul>											0	
		Fail Sate Valves										ļ			<u> </u>
			Demonstrate how to install bolt completely into the nut.											0	
			Demonstrate how to select and install the appropriate ring gaskets in all connections.			ļ								0	
			Demonstrate proper torque sequence to insure flange gap is even on all sides.											0	
			<ul> <li>Demonstrate that all BOP components have been inspected and certified in accordance</li> </ul>											0	
			with OEM specifications.												
			Explain how to guide upper BOP sections onto lower sections.											0	
			Explain how to install new ring and wellhead gaskets.											0	
			Explain now to open the BOP doors and change pipe rams and blind rams.											<u> </u>	
			Explain UEIVI specifications and certification for BUP components.											U	
			<ul> <li>Explain the importance of always using new and appropriate ring gaskets in all</li> </ul>											0	
			connections.			ļ									<u> </u>
			<ul> <li>Explain the importance of having the proper flange gap on all sides.</li> </ul>			ļ								0	
			Explain the importance of why all bolts need to be engaged comletely into the nut.			ļ								0	
			<ul> <li>Explain the proper assembly (stack-out) of all BOP components to be used per drilling</li> </ul>											0	
			program.		1									-	

# Annex-13 : Competency Table: – Toolpusher 9/20

Pos	ition		Toolpusher			Compete	ncy level	required			Proficiency	Scale		GAP	Individual Development Plan
						Re	quired Sco	ore			Actual Sco	ore			
No	Cod	No	Functional competency	Description of competency	<b>Awareness</b>	Application	Career	Advanced	Expert	Awarene	Applicati Career	Advance	Expert		
					1	2	Proficient	Level	Level	SS	on Proficien	d Level	Level		
89	DL	89	Well Control Equipment: BOP Testing	<ul> <li>Demonstrate how to connect the test lines and secure from test unit to BOP.</li> </ul>										0	
			Equipment											-	
				<ul> <li>Demonstrate how to open the BOP doors and change rams.</li> </ul>										0	<b>↓</b>
				<ul> <li>Demonstrate that hydraulic lines are of proper pressure rating.</li> </ul>										0	
				Demonstrate that the test unit is of adquate pressure rating to test the BOP.										0	
				<ul> <li>Explain now to connect the test lines and secure from test unit to BOP.</li> </ul>										0	
				Explain now to open the BOP doors and change rams.										0	
				Explain test unit pressure requirements in relation to BOP testing.										0	
00	DI	00	Wall Central Equipments Full Opening Safety	Explain the requirements for BOPE hydraulic lines.			<u> </u>							0	
90	DL	90	Value, Kelly seek value, IROP	Demonstrate now to function test each valve.										0	
			valve, Kelly COCK valve, IBOP	• Evaluin each tool, their function, storage position and location of each											
				Explain each tool, their function, storage position and location of each.     Explain the importance all wrenches for each cafety value are kent orderly and are readily.											
				Explain the importance all wienches for each safety valve are kept ordeny and are readiny     available										0	
				Explain the importance of inspecting value connections in accordance with drill string											
				requirements										0	
91	DI	91	Well Control Equipment: Float Valve	Demonstrate how to visually inspect float valves for damage										0	
51		51	Weil control Equipment. Hour vulve	Demonstrate the installation of float valve in drill string										0	
				Explain how to visually inspect float valves for damage									1	0	
				<ul> <li>Explain the installation of float valve in drill string.</li> </ul>										0	
92	DL	92	Well Control Equipment: Diverter	Demonstrate a function test and operation of diverter and valves.										0	
				Demonstrate the ability to configuration all components in diverter system including flow										-	
				lines, valves, and sizing for the application per the drilling program.										0	
				<ul> <li>Explain a function test and operation of diverter and valves.</li> </ul>									1	0	
				• Explain the configuration of all components in diverter system including flow lines, valves,										0	
				and sizing for the application per the drilling program.										0	
				<ul> <li>Explain the purpose of a diverter system as opposed to a BOP.</li> </ul>										0	
93	DL	93	Well Control Equipment: Wellhead Adaptor	Demonstrate sizing and pressure rating of spools for wellhead and BOP equipment meet										0	
			Spools and Risers	requirements of drilling program.										U	
				<ul> <li>Demonstrate that flow lines are routed and secured at a location and distance to allow for</li> </ul>										0	
				flaring and/or fluid containment.										0	
				<ul> <li>Explain flow lines routing and anchoring for flaring and/or fluid containment.</li> </ul>										0	
				<ul> <li>Explain sizing and pressure rating of spools for wellhead and BOP equipment per drilling</li> </ul>										0	
				program.										0	
94	DL	94	Well Control: Testing BOP: Pressure And	Demonstrate how to ensure tool joint space out within the BOP are adequate and a vent										0	
			Function Testing Of BOPs	open below the wellhead test plug is open.											
				<ul> <li>Demonstrate that appropriate ring gaskets are used for each flange.</li> </ul>				ļ						0	
				<ul> <li>Demonstrate the test sequence of valves and BOP's including identifying leaks and how to</li> </ul>										0	
				correct them.											
				<ul> <li>Explain how to identify ring gaskets in relation to BOP flanges.</li> </ul>										0	<b>├</b> ─── <b>├</b> ─── <b>├</b> ─── <b>│</b>
1				<ul> <li>Explain the test sequence of valves and BOP's including identifying leaks and how to</li> </ul>										0	
				correct them.											
1				<ul> <li>Explain tool joint placement (space out) within the BOP and the purpose of venting below the test slup.</li> </ul>										0	
L				the test plug.				l				1	1		

# Annex-13 : Competency Table: – Toolpusher 10/20

Pos	tion	:	Toolpusher			Compet	ency level	required			Pro	ficiency	Scale		GAP	Individ	ual Develo	pment Plan
						Re	equired Sc	ore			A	tual Sco	ore					
No	Cod	e No	Functional competency	Description of competency	Awareness	Applicatio	n Career	Advanced	Expert	Awarene	Applicat	Career	Advance	Expert		-		
110	cou		r unctional competency	Description of competency	1	2	Proficient	Level	Level	ss	on	Proficien	d Level	Level				
95	DL	95	Well Control:Testing BOP: Pressure And	<ul> <li>Demonstrate how to function the valves to their fully open and closed positions and align for drilling operations</li> </ul>											0			
			ranetion resting of bors choice manifold	<ul> <li>Demonstrate how to lubricate valves with the high pressure grease.</li> </ul>							+				0			1
				<ul> <li>Demonstrate how to test to rated pressures and durations and how to bleed off test</li> </ul>			-						1		-	-		
				pressure after test.											0			
				<ul> <li>Explain how to test to rated pressures and durations and how to bleed off test pressure after test</li> </ul>											0			
				<ul> <li>Explain how to function the valves to their fully open and closed positions and align for</li> </ul>							+	+	++		-			
				drilling operations.											0			
				<ul> <li>Explain how to lubricate valves with the high pressure grease.</li> </ul>											0			
96	DL	96	Well Control:Testing BOP: Pressure And	Demonstrate how to function the valves to their fully open and closed positions and align														
			Function Testing Of BOPs Kill and Chokeline Valves	for drilling operations.											0			
				Demonstrate how to lubricate valves with the high pressure grease.		1	+	1				+	1		0			
				Explain how to test to rated pressures and durations and how to bleed off test pressure							1				0			
				after test.											U			
				<ul> <li>Explain how to function the valves to their fully open and closed positions and align for</li> </ul>											0			
				drilling operations.		ļ		ļ			ļ							
07		107		Explain how to lubricate valves with the high pressure grease.											0		_	
97	DL	97	Well Control: Testing BOP: Pressure And	<ul> <li>Demonstrate how to function the valves to their fully open and closed positions and align for deiling acceptions</li> </ul>											0			
			Standnine manifold	for driving operations.											0			
				Demonstrate how to lubricate valves.			+								0			
	1	-		Demonstrate how to test to rated pressures and durations and how to bleed off test		İ			~~~~~		1		1		-			
				pressure after test.											0			
				<ul> <li>Explain how to test to rated pressures and durations and how to bleed off test pressure after test.</li> </ul>											0			
				<ul> <li>Explain how to function the valves to their fully open and closed positions and align for</li> </ul>											0			
	+			ariling operations.									$\left  \right $					
98		103	Niesel numns	<ul> <li>Explain now to abricate valves.</li> <li>Explain when the different types of closed loop mud cleaning equipment are used</li> </ul>											0		_	
50	DL	105	Dieser pumps	<ul> <li>Demonstrate the use and maintenance of diesel pumps.</li> </ul>							1				0			
				<ul> <li>Explain the the importance of rig fuel filtering system.</li> </ul>											0	-		
				<ul> <li>Explain the use and maintenance of diesel pumps.</li> </ul>											0			
99	DL	105	Centrifugal pumps	<ul> <li>Demonstrate how to prime and maintain a centrifugal pump.</li> </ul>											0			
				Explain how to prime and maintain a centrifugal pump.											0			
100	DL	106	Diaphram pumps	Demonstrate how to prime and maintain a diaphram pump.		ļ							ļļ		0			l
101	DI	107	Value types	Explain now to prime and maintain a diaphram pump.								-			0	$\vdash$	_	
101	DL	107	valve types	Demonstrate now to operate low pressure and high pressure valves.			+								0			
				<ul> <li>Explain the unreferring types of valves used in much systems and where each type is applicable.</li> </ul>											0			
102	DL	108	Rotary swivel	<ul> <li>Explain what a rotary swivel is and when it is used.</li> </ul>											0			
103	DL	112	Tubulars: Tubular care and maintenance	<ul> <li>Demonstrate how to store and transport tubulars.</li> </ul>											0			
				<ul> <li>Demonstrate how to clean and inspect connections during drilling and tripping operations.</li> </ul>											0			
				<ul> <li>Explain how the slips and rotary bushing relate to the care of tubulars.</li> </ul>		ļ					ļ		1		0			
				Explain how to break in new tool joints.		ļ					ļ		<u> </u>		0			
				<ul> <li>Explain how to clean and inspect connections during drilling and tripping operations.</li> </ul>		ļ		ļ			<u> </u>		<u> </u>		0			<u> </u>
				<ul> <li>Explain the different types of mechanical surface imperfections that should be monitored or provopted that could lead to failures.</li> </ul>											0			
				Explain the importance of breaking in new tool joints								-			0			
				<ul> <li>Explain the importance of cleaning and inspection of tubular connections.</li> </ul>		1		1			1	+			0			1
				Explain the procedures for storing and transporting tubulars.							1	1	1		0			
				Explain why thread compound is used.			1	1				Τ			0			

# Annex-13 : Competency Table: – Toolpusher 11/20

Position: Toolpusher			Compete	ency level	required			Profi	ciency S	Scale		GAP	Individual Development Plan
			Re	quired Sco	ore			Act	tual Sco	re			
No Code No Functional competency	Description of competency	Awareness 8	Application	Career	Advanced	Expert	Awarene	Applicati	Career	Advance	Expert		
		1	2	Proficient	Level	Level	SS	on	Proficien	d Level	Level		
104 DL 114 Tubulars: Make Up/ Break Out of Drilling Bits	Demonstrate how to apply the required torque for different thread connections on all											0	
	tubular, subs and drill bits.											-	
	• Explain torque requirements for different thread connections on all tubular, subs and drill											0	
	bits.		ļ									Ŭ	
105 DL 115 Completions: Coiled Tubing (CT)	<ul> <li>Explain the importance of ensuring why all surface equipment (BOP, coil tubing lines, etc.)</li> </ul>											0	
	must be tested.											-	
	Explain the possible consequence of coil tubing failure (bursts, whiplash, etc.).		-									0	
106 DL 116 Completions: Completions string	Demonstrate how to ensure tubing hanger lands appropriately on wellhead.											0	L
	<ul> <li>Demonstrate the correct running order of completion tubulars and correct space-out with</li> </ul>											0	
	seal assembly.												
	<ul> <li>Explain the correct running order of completion tubulars and correct space-out with seal</li> </ul>											0	
	assembly.												
	Explain the differences between handling tubing vs. drill pipe.											0	
107 DL 118 Fishing Equipment	<ul> <li>Demonstrate the ability to PU BHA assembly of fishing tools and run in hole.</li> </ul>				ļ							0	L
	<ul> <li>Demostrate how to POOH with fish engaged.</li> </ul>											0	
	Explain BHA assembly of fishing tools and knowledge of down-hole operations.											0	
	Explain the procedure and precautions when POOH with fish.											0	
108 DL 119 Forklift Operations	<ul> <li>Demonstrate how to operate forklift.</li> </ul>											0	
	Demonstrate the ability to perform rigging and determine lifting capacities for forklift.											0	
	Demonstrate the inspection and general maintenance procedure for a forklift.											0	
	Explain how to operate forklift.											0	
	<ul> <li>Explain rigging and lift capacities for forklift.</li> </ul>											0	
	Explain the inspection and general maintenance of forklift.											0	
109 DL 120 Cementing	<ul> <li>Calculate strokes required to bump the cement plug while displacing with rig pump.</li> </ul>											0	
	<ul> <li>Explain the charactistics and importance of a proper cement job.</li> <li>Maniferentiate and distinguish the difference between several deiling</li> </ul>											0	
	Initial     Initial											0	
	Tiula.												
110 DL 121 Other Organizations Dlug & Abander Miell	Rig-up cementing lines and line up valves/ transfer mud to cementing unit.			-								0	
110 DL 121 Other Operations: Plug & Abandon Well	Demonstrate now to follow the plug and abandon program.											0	
	Demonstrate now to perform pressure testing after plug has cured.		+										
	Demonstrate tripping after cement plug is set in place.											0	
	Explain now to perform pressure testing after plug has cured.												
	Explain the plug and abandon program.     Explain tripping procedure after compart plug is set in place											0	
111 DI 122 Other Operations: Drillstom Test	Explain hipping procedure after centeric plug is set in place.     Demonstrate the ability to perform drillstom test procedure and related operations.						-					0	
111 DL 122 Other Operations. Divisitent rest	<ul> <li>Demonstrate the ability to perform uninstem test procedure and related operations.</li> <li>Demonstrate how to make up and torque components of the drill stem test assembly.</li> </ul>											0	
	<ul> <li>Demonstrate now to make up and torque components of the drift stem test assembly.</li> <li>Demonstrate safe tripping speeds and procedures in cased and open hole.</li> </ul>											0	
	Explain how to make up and torque components of the drill stem test assembly											0	
	<ul> <li>Explain now to make up and torque components of the dnil stem test assembly.</li> <li>Explain safe trinning speeds and procedures in cased and onen hole</li> </ul>		+									0	
	Explain successful procedures in cased and open noic.     Explain the drillstem test procedure and related operations		1									0	
112 DL 123 Other Operations: Conductor and Casings	Demonstrate how to determine the back-up tong line is sized and installed correctly		1									0	
112 DE 123 Other Operations, conductor and casings	Demonstrate how to determine the back-up tong line is sized and installed confectly.      Demonstrate how to identify cross-threaded nine		1									0	
	Demonstrate how to stab casing		1				+					0	
	Demonstrate visual inspection of casing threads for damage and cleanliness		1		İ							0	
	<ul> <li>Explain how to determine the back-up tong line is sized and installed correctly</li> </ul>		1				1					0	<u> </u>
	Explain how to determine the back up tong line is sized and installed concerny.											0	<b>****</b>
	Explain how to stab casing						1					0	
	Explain new to stab casing.     Explain visual inspection of casing threads for damage and cleanliness		1									0	
	Explain visual inspection of casing threads for damage and cleaniness.		1	1	1	1				1		v	

# Annex-13 : Competency Table: – Toolpusher 12/20

Position:	Toolpusher		Compete	ency level re			Proficiency	Scale		GAP	Individual Development Plan	
			Re	quired Scor	e			Actual Sco	ore			
No Code No	Functional competency	Description of competency	Awareness Application	Career	Advanced	Expert	Awarene	Applicati Career	Advance	Expert		
	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,		1 2	Proficient	Level	Level	SS	on Proficien	d Level	Level		
113 DL 124	Other Operations: Casing Stabbing Board	<ul> <li>Demonstrate how to rig up and postition stabbing board.</li> </ul>									0	
		<ul> <li>Explain how to rig up and postition stabbing board.</li> </ul>									0	
114 DL 125	Other Operations: Logging	<ul> <li>Demonstate how to rig up the wireline sheaves, (in mast and V-door).</li> </ul>									0	
		<ul> <li>Demonstrate how to monitor well conditions during logging operation.</li> </ul>									0	
		<ul> <li>Demonstrate how to rig up packoff/lubricator assembly.</li> </ul>									0	
		<ul> <li>Explain how to monitor well conditions during logging operation.</li> </ul>									0	
		<ul> <li>Explain how to rig up the wireline sheaves, (in mast and V-door).</li> </ul>		ļ							0	
		<ul> <li>Explain the procedure for rigging up packoff assembly.</li> </ul>		ļļ.							0	
		<ul> <li>Explain well control shut in during wireline logging depending on type and length of</li> </ul>									0	
		packoff/lubricator assembly being used.		ļ							Ů	
115 DL 126	Other Operations: Mud Characteristics	<ul> <li>Demonstrate how to maintain correct mud properties mixing chemicals to mud as</li> </ul>									0	
		instructed by mud engineer.		ļ								
		<ul> <li>Demonstrate how to manage aerated or if it is gas-cut mud.</li> </ul>		ļ							0	
		<ul> <li>Demonstrate how to monitor solids control equipment.</li> </ul>									0	
		<ul> <li>Demonstrate how to record mud weight, viscosity, and volumes.</li> </ul>									0	
		<ul> <li>Demonstrate the mixing of chemicals required for the operation.</li> </ul>									0	
		<ul> <li>Explain how to identify if mud is aerated or if it is gas-cut.</li> </ul>		ļ							0	
		<ul> <li>Explain how to record mud weight, viscosity, and volumes.</li> </ul>									0	I
		<ul> <li>Explain how to utilize the different solids control equipment for mud filtration.</li> </ul>		<u> </u>							0	
		<ul> <li>Explain the basic chemicals needed for the operation.</li> </ul>									0	<b>_</b>
		<ul> <li>Explain the characteristics of drilling fluids &amp; their purpose.</li> </ul>									0	
		<ul> <li>Explain the importance of communicating mud properties and all fluid changes to rig</li> </ul>									0	
446 DI 427	Other Original Multi-	Personnel.		+							0	
116 DL 127	Other Operations: Mud Transfer	<ul> <li>Demonstrate how to line up valves, hoses and hard piping for the mud system transfers.</li> </ul>		+							0	
		<ul> <li>Demonstrate now to notify personnel of transfers, monitor mud volume sensors and re- set ence completed.</li> </ul>									0	
		Set once completed.									0	
		Explain the process for mud system transfers		+							0	
117 DI 129	Other Operations: Drill Water System	Explain the process for mud system transfers.		+							0	
117 DL 128	Other Operations. Drin water system	Demonstate now to maintain adequate unit water.      Evaluate the importance of maintaining adequate water volume for drilling exercisions		+							0	
118 OHSE 01	Induction (Post Hire Corporate and Unit	Explain the importance of maintaining adequate water volume for drining operations.		+ +							0	
118 QUE 01	Specific)	<ul> <li>Demonstrate infinediate response during coordinated drins (including your assigned Muster Station(c) and location of your Lifeboat(s) (if applicable)</li> </ul>									0	
	specific)	Evolution according to the Emergency Response Plans or		+								
		Station Bill									0	
		Evolution bin: Evolution bin:									0	
		<ul> <li>Explain the general dates of the only erew specific positions.</li> <li>Explain your company's position in regard to compliance with regulatory requirements.</li> </ul>		1								
		(for applicable position)									0	
		<ul> <li>Explain your Company's specific Short Service Employee program (if applicable).</li> </ul>									0	
		<ul> <li>Identify and explain the various components of the Rig or Unit.</li> </ul>		1							0	
		<ul> <li>Provide evidence of completion of the Corporate and Unit Specific Induction/Orientation</li> </ul>										
		course.									0	
119 QHSE 04	Quality, Health, Safety, Environment and Security (QHSES) Policy	• Describe your role and responsibilities in order to comply with company's QHSES policies.									0	
	,	• Explain good housekeeping practices and personal hygiene practices in accordance with									0	
		Evaluate the company's OWSES policies (as applicable)		+							0	<b>↓</b>
		<ul> <li>Explain the chieffine and the importance of active participation is the chieffine and the importance of active participation is the chief of the chief of the chief of the chief of the chief of the chief of the chief of the chief of the chief of the chief of the chief of the chief of the chief of the chief of the chief of the chief of the chief of the chief of the chief of the chief of the chief of the chief of the chief of the chief of the chief of the chief of the chief of the chief of the chief of the chief of the chief of the chief of the chief of the chief of the chief of the chief of the chief of the chief of the chief of the chief of the chief of the chief of the chief of the chief of the chief of the chief of the chief of the chief of the chief of the chief of the chief of the chief of the chief of the chief of the chief of the chief of the chief of the chief of the chief of the chief of the chief of the chief of the chief of the chief of the chief of the chief of the chief of the chief of the chief of the chief of the chief of the chief of the chief of the chief of the chief of the chief of the chief of the chief of the chief of the chief of the chief of the chief of the chief of the chief of the chief of the chief of the chief of the chief of the chief of the chief of the chief of the chief of the chief of the chief of the chief of the chief of the chief of the chief of the chief of the chief of the chief of the chief of the chief of the chief of the chief of the chief of the chief of the chief of the chief of the chief of the chief of the chief of the chief of the chief of the chief of the chief of the chief of the chief of the chief of the chief of the chief of the chief of the chief of the chief of the chief of the chief of the chief of the chief of the chief of the chief of the chief of the chief of the chief of the chief of the chief of the chief of the chief of the chief of the chief of the chief of the chief of the chief of the chief of the chief of the chief of the chief of the chi</li></ul>									U	<u> </u>
		<ul> <li>Explain the objectives and the importance of active participation in the various meetings held onsite/onboard (Induction meeting, Pre-shift meeting, Weekly safety meeting, Risk</li> </ul>									0	
		Assessment/Pre-job meeting).		1			1					

# Annex-13 : Competency Table: – Toolpusher 13/20

Posit	ion:	Toolpusher				Compete	ency level	required			Prof	iciency :	Scale		GAP	In	dividual	Develo	pment Plan
						Re	quired Sco	ore			Ac	tual Sco	ore						
No	Code No	Functional competency		Description of competency	Awareness	Application	Career	Advanced	Expert	Awarene	Applicati	Career	Advance	Expert					
					1	2	Proficient	Level	Level	SS	on	Proficien	d Level	Level			-,	;	8 1
120	QHSE 04	Quality, Health, Safety, Environment and Security (QHSES) Policy	•	Identify where you would find the company QHSES Policies.											0				
121	QHSE 05	HSE Local Regulations and Relevant International Standards	•	Explain the local HSE regulations (Standards, laws and regulations that apply to occupational health and safety).											0				
122	QHSE 06	Quality Safety & Management System	•	Demonstrate the ability to navigate the company specific Quality Safety & Management System.											0				
123	QHSE 07	Station Bill/Emergency Response Plan and Emergency Drills	•	Demonstrate the ability to perform the assigned duties as per the station bill/emergency response plan.											0				
			•	Demonstrate the correct donning, doffing and stowing of emergency PPE.											0				
			•	Describe all the emergency alarm sounds as well as the respective actions to take (H2S,															
				Well Control, Fire Alarm, Abandon Alarm, Gas Alarm, Man overboard Alarm, Loss of Station Position etc).											0				
			•	Describe and identify the location of your muster point(s).											0				
			•	Describe the process to search and rescue personnel unaccounted for in an emergency situation.											0				
			•	Identify the various site specific emergency equipment (Portable fire extinguishers, fixed fire systems such as CO2, Life Boat, Life Raft, Rescue Boat, Escape Ladder etc).											0				
124	QHSE 08	Emergency Preparedness and Response	•	Demonstrate the assigned duties to be carried out during various emergencies/drills (for example: Fire Drill, Abandon Drill, Gas Drill, Man Overboard Drill, Man Down, Stability Drill, Well Control Drill, SOPEP Drill, Helpdesk Fire Drill, Blackout Drill).											0				
			•	Demonstrate the proper recording and completion of all emergency response training and drills.											0				
			•	Describe and identify the escape routes, markings, signage systems and lighting systems as applicable.											0				
			•	Describe and identify the location of all emergency alarm actuators.											0				
			•	Describe how to react to well control situations and how often well control drills are conducted.											0				
			•	Describe the rig (unit) emergency response abandonment and notification procedures.											0				
			•	Explain the assigned duties to be carried out during various emergencies/drills (for											0				
				Drill, Well Control Drill, SOPEP Drill, Helpdesk Fire Drill, Blackout Drill).											U U				
			٠	Explain the oil spill emergency plan(s) (Shipboard Oil Pollution Emergency Plan/Spill Prevention Control and Countermeasures Plan).											0				
			•	Explain the site specific emergency responses, exercises and training plans for all major hazardous situations.											0				

### Annex-13 : Competency Table: – Toolpusher 14/20

Position: Toolpusher		Competency level required							iciency S	Scale		GAP	Individ	lual Develo	pment Plan
			Rec	quired Sco	ore			Ac	tual Sco	re					
No Code No Functional competency	Description of competency	Awareness	Application	Career	Advanced	Expert	Awarene /	Applicati	Career	Advance	Expert				
		1	2	Proficient	Level	Level	SS	on	Proficien	d Level	Level				
125 QHSE 09 Risk Assessments (RA)	Demonstrate the ability to verify that risk control measurements are implemented and											0			
	demonstrate how to assess their effectiveness.									ļ					
	<ul> <li>Describe and demonstrate how safety critical equipment is tested and maintained.</li> </ul>											0			
	<ul> <li>Describe now simultaneous operations (SIVIOPS) are managed to ensure that risk control presedures are in place during the execution of related activities.</li> </ul>											0			
	Describe the operational boundaries and performance standards of the cafety critical		<u> </u>												+
	<ul> <li>Describe the operational boundaries and performance standards of the safety critical equipment</li> </ul>											0			
	Describe the potential bazards on site and provide examples of what could trigger them														
	and what could be their associated consequences.											0			
	Describe the process by which potential or unforeseen risks are communicated to											0			
	management and affected employees.											0			
	<ul> <li>Describe the process to systematically identify, evaluate, select and implement risk</li> </ul>									1		0			
	reducing controls.											0			
	<ul> <li>Describe the roles and responsibilities of personnel participating in the risk assessment</li> </ul>											0			
	process.									ļ					
	<ul> <li>Describe the site specific risk assessment process.</li> </ul>		ļ									0			
	<ul> <li>Explain adverse environmental conditions by which the unit should not operate and the</li> </ul>											0			
	alerting systems available on site.														
	Explain and demonstrate now to stop and secure work or tasks in case or any unforeseen or upplapped changes or bazards, and how to further accors risks associated with these											0			
	changes or hazards											0			
	<ul> <li>Explain how the interaction of major bazards within your unit has been considered during</li> </ul>														
	<ul> <li>Explain new the interaction of major national your unit has been considered using normal or simultaneous operations.</li> </ul>											0			
	Explain how to apply the hazard recognition and risk assessment techniques and the											_			
	ability to implement risk mitigation measurements and controls.											0			
	<ul> <li>Explain the maintenance and control of risk assessment documents.</li> </ul>											0			
	<ul> <li>Explain when/if operations can continue when risk associated with simultaneous</li> </ul>									1		0			
	operations, inadequate equipment or lack of personnel are present.														
	<ul> <li>Identify and describe the safety critical equipment on site.</li> </ul>											0			
126 QHSE 11 Behavioral Based Safety System (BBSS)	<ul> <li>Demonstrate the corrective action/feedback process in the BBSS program for an observed</li> </ul>											0			
	unsafe action/behavior.		ļ												
	Demonstrate the process to record and track non conformities from BBSS Observations.											0			
	Describe the difference between an unsafe action/benavior and an unsafe condition.														+
	<ul> <li>Describe the importance of reviewing past bbss observations and behaviors at safety meetings</li> </ul>											0			
	Describe your role in the BRSS											0			
	<ul> <li>Explain the company's BBSS.</li> </ul>											0			
	<ul> <li>Demonstrate the ability to secure the current work area or operation before evacuating</li> </ul>														
	during an emergency or drill.											0			
127 QHSE 12 General Housekeeping/Orderliness	Demonstrates ability to ensure that the work area is clean and orderly, prior to and upon											0			
	completion of the work, task or repairs.		İ									U			
	<ul> <li>Demonstrates ability to maintain and inspect hand and power tools in operationally safe</li> </ul>											0			
	condition, without any unauthorized modifications.														
	<ul> <li>Explain the hazards associated with using defective or modified hand or power tools.</li> </ul>											0			
	<ul> <li>Explain the importance of closing out hazardous work activities before evacuating the area</li> </ul>											0			
	for an emergency or drill.														
	<ul> <li>Explain the importance of good housekeeping practices in the work areas and living quarters</li> </ul>											0			
	yuditers. Evaluation why it is important to keep tools but away and the work place clean in case of an												++		+
	Explain why it is important to keep tools put away and the work place clean in case of an     emergency											0			
	<ul> <li>Explain your role in the housekeeping practices in the work areas and living quarters</li> </ul>											0	<b> </b> +		+
	<ul> <li>Demonstrate cleaning and organizing the work area upon completion of the work, task, or</li> </ul>											-			
	repairs.											0			
	Explain procedures personnel should follow if they observe worksite and water pollutants				1									İ	
	during lifting operations.											U			

## Annex-13 : Competency Table: – Toolpusher 15/20

Position: To	oolpusher		(	Compete	ncy level	required			Profi	ciency s	Scale		GAP	Individual Deve	lopment Plan
				Rec	quired Sco	ore			Act	tual Sco	re				
No Code No Fur	unctional competency	Description of competency	Awareness A	Application	Career	Advanced	Expert	Awarene	Applicati	Career	Advance Ex	pert			
		· · · ·	1	2	Proficient	Level	Level	ss	on	Proficien	d Level L	vel			
128 QHSE 13 Env	nvironmental Management Plan	Describe the company Environmental Management Plan (EMP).									ļ		0		
		Describe the location specific sensitivities of the receiving environment.											0		
		Describe the process for handling or discharging cuttings.											0		
	•	Describe the process for maintaining environmental discharge or emission records and the table of the second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second se											0		
		their location.													
420 OUCE 44 Chi	in Oil Dellution Francisco Disc (CODED)	Describe the process for monitoring discharges and emissions.											0		
129 QHSE 14 Shi	hip Oil Pollution Emergency Plan (SOPEP)	Describe the spanific SDCC plan precedures to follow in case of a shill											0		+
150 QHSE 15 Spli	an (SPCC)	Describe the fig specific spece plan procedures to follow in case of a spin.											0		
Fid	an (secc)	Demonstrate the ability to locate the SPCC Plan											0		
		Demonstrate the ability to locate the Spill kit.				+							0		
		Describe the SPCC inspection process for the location and equipment before spud in.											0		
		Describe the spill kit contents and how to use them.											0		
		Explain how the SPCC plan bridges to the operator's well site plan.											0		
		Explain the process or requirements of training on the SPCC elements.											0		
		Explain the reporting procedures in the event of a spill on or off the well site location.											0		
		Explain the SPCC containment system including the layout, need and maintenance.											0		
		Explain your role in a SPCC drill or an actual spill.											0		
131 QHSE 16 Wa	aste Segregation	Describe the company waste management plan.											0		
	•	Describe the waste materials (either solid or liquid), and identify/categorize as one of the following provide the solid or liquid).											0		
		following: common waste, industrial waste, nazardous waste and recyclable materials.	+												
		bescribe what materials should be placed into the waste containers and why they need to be corrected											0		
		Explain the continuous improvement of waste handling on the unit/location											0		
		Explain the contained simple containers provided for common waste, industrial waste, hazardous				1									
		waste and recyclable materials.											0		
132 QHSE 17 Dro	ropped Objects Prevention	Describe the hazards associated while work is being conducted overhead.				1							0		
		Describe the main hazard areas/zones where dropped objects may occur.											0		
		Explain how potential dropped objects are identified and how they should be reported.											0		
		Explain how the restricted areas/zones are enforced.											0		
	•	Explain precautionary measures required to avoid causing dropped objects and to protect											0		
		personnel from those potential hazards.													
	•	Explain the importance of a daily/weekly/monthly/annual dropped objects prevention											0		
		Explain why access should be restricted to all known dropped object areas /apper											0		
133 OHSE 10 Fall	Il Protection	Demonstrate the ability to find the fall arrest or restraint gear/equinment's information											0		
100 Quice 10 100		tap.											0		
		Demonstrate the ability to select the proper size and type as well as the donning of, and											-		
		correct usage, of fall arrest gear.											0		
		Demonstrate transferring from one location to another while maintaining 100 percent tie											0		
		off while working at heights.											· · · · · · · · · · · · · · · · · · ·		
		Describe the difference between fall arrest and fall restraint.											0		
	•	Describe the emergency equipment and procedures (rescue plan) when rescuing someone											0		
		at neights.													
		Describe the general requirements or the rail protection.				++							0		
		Describe the management of defective fall arrest equipment				+							0		
		Describe the proper maintenance, cleaning, inspection (including documentation) and													
		storage of fall arrest equipment.											0		
		Describe the proper use of ladders (fixed and portable) or scaffolds.											0		
		Describe the proper work procedures and communication using fall protection while											0		
		working in an aerial lift platform (man-lift/work basket).				ļ							U		
		Describe the types of fall protection and fall arrest gear/equipment and how it is used.				ļ							0		
	•	Explain the different types of fall protection and fall arrest systems and how each of them											0		
		work.													
		<ul> <li>Explain the importance of maintaining the proper overhead anchorage point.</li> </ul>						I I					U		1

## Annex-13 : Competency Table: – Toolpusher 16/20

Position:	Toolpusher			Compete	ency level	required			Proficiency	Scale		GAP	Individual Development Plan
				Re	quired Sc	ore			Actual Sco	ore			
No. Code No.	Functional competency	Description of competency	Awareness	Application	Career	Advanced	Expert	Awarene	Applicati Career	Advance	Expert		
no coucito	runetional competency	Beschption of competency	1	2	Proficient	Level	Level	SS	on Proficien	d Level	Level		
134 QHSE 20	Safe Use Of Lifting Equipment	<ul> <li>Explain who is authorized to operate lifting equipment.</li> </ul>										0	
		Demonstrate proper hand and body placement when attaching the rigging to a load.										0	
		<ul> <li>Demonstrate the ability to properly operate lifting equipment.</li> </ul>										0	
		Demonstrate the ability to select the correct lifting equipment for the task at hand.										0	
		Demonstrate the proper use of tag lines attached to loads including proper positioning.										0	
		Demonstrate the verbal communications and hand signals used in lifting operations.										0	
		<ul> <li>Describe the basic work sequence/policy and precautions that must be in place prior to</li> </ul>										0	
		making a critical lift.			ļ	ļ				ļ		-	
		<ul> <li>Describe the lifting equipment available on location.</li> </ul>				ļ						0	
		<ul> <li>Describe the maintenance, storage and inspection of all lifting equipment</li> </ul>										0	
		(rigging/slings/shackles, etc.).											
		<ul> <li>Describe the proper installation and rigging of all permanent and temporary lifting points</li> </ul>										0	
		(anchor points, pad eyes, etc.).											
		<ul> <li>Describe the proper use of tag lines attached to loads including proper positioning and</li> </ul>										0	
		quantity.											
		<ul> <li>Describe the verbal communications and hand signals used in lifting operations.</li> </ul>										0	
		<ul> <li>Explain proper hand and body placement when attaching the rigging to a load.</li> <li>Evaluate the importance of a spetter during blind lifting operations.</li> </ul>										0	
		Explain the importance of a spotler during bind intring operations.										0	
		<ul> <li>Explain the minimum number of personnel and special precautions to be used during critical lifting operations.</li> </ul>										0	
		Evaluation the area lift alon and increasions process										0	
		Explain the responsibilities of a rigger (banksman)										0	
		Explain the responsibilities of a figger (barrisman).     Explain what constitutes a critical lift										0	
135 OHSE 21	Lifting of Personnel	Demonstrate the ability to properly utilize personnel lifting equipment										0	
135 QUSE 21	Litting of Personner	Demonstrate the ability to select the proper personnel lifting equipment/device			+							0	
		Demonstrate the inspection of personnel lifting equipment			1							0	
		<ul> <li>Describe safety precautions necessary for the use of personnel lifting devices.</li> </ul>			1					1		0	
		<ul> <li>Explain conditions, authority, and hand signals necessary to stop personnel lifting</li> </ul>			1								
		operations.										0	
		<ul> <li>Explain the importance of using load balance, weight tolerances, and environmental</li> </ul>			1	1							
		conditions before and during personnel transfer.										0	
		Explain the inspection of equipment necessary for lifting of personnel.										0	
		<ul> <li>Explain the precautions and pre-lift requirements before personnel are transferred or</li> </ul>											
		lifted.										0	
136 QHSE 22	Crane Safety	<ul> <li>Describe the maintenance, storage and inspection of all lifting equipment</li> </ul>											
		(rigging/slings/shackles, etc.).										0	
137 QHSE 23	Use and maintenance of utility winch	Demonstrate rigging practices for safe lifting and movement of tubulars and irregular										0	
		shaped equipment/materials.										U	
		Demonstrate the hand signals used during winch operations.										0	
		<ul> <li>Demonstrate the operation of a utility winch.</li> </ul>										0	
		<ul> <li>Describe the operational and safety responsibilities of a winch operator.</li> </ul>										0	
		<ul> <li>Describe the specific locations where utility winches are installed on the unit.</li> </ul>							Į			0	
		<ul> <li>Explain rigging practices for safe lifting and movement of tubulars and irregular shaped</li> </ul>										0	
		equipment/materials.							L				
		<ul> <li>Explain the capacity and limitations of utility winches.</li> </ul>								4		0	
		Explain the pre-use inspection steps required before operating a utility winch.			1				ļ			0	
		<ul> <li>Explain the required maintenance for a utility winch and accessories.</li> </ul>						1		1		0	

# Annex-13 : Competency Table: – Toolpusher 17/20

Position:	Toolpusher			Compete	ncy level	required			Profi	ciency	Scale		GAP	Indi	ividual D	evelop	ment l	Plan
				Re	quired Sco	ore			Act	tual Sco	ore							
No Code No	Functional competency	Description of competency	Awareness	Application	Career	Advanced	Expert	Awarene	Applicati	Career	Advance	Expert						
			1	2	Proficient	Level	Level	SS	on l	Proficien	d Level	Level			<b></b>		<u> </u>	
138 QHSE 25	Accident/Incident Investigation	<ul> <li>Describe the company policy on determining the actual and potential risk of an incident or</li> </ul>											0			.		
		near miss.													-+			
		<ul> <li>Explain the company's policies/procedures for reporting an incident resulting in personal injuny, equipment damage, a pear miss or any notential bazard.</li> </ul>											0			.		
		Evolution the importance of active participation in an incident investigation											0		-+	,t-		
		Explain the importance of following up and closing corrective actions									+		0		++			
		Explain the importance of following up and closing corrective actions:     Explain the processes used to identify incident causes.									1		0		++	t		
		<ul> <li>Explain what a corrective action is and why it is being implemented.</li> </ul>									1		0		++	, <del> </del>		
		<ul> <li>Explain why facts are important to an incident investigation.</li> </ul>	~~~~~~	1							1		0		++			
139 QHSE 26	Chemical Handling & SDS (MSDS) (GHS)	Demonstrate selection and correct use of PPE when handling chemicals in accordance											0					
		with the SDS.											0			.		
		• Describe appropriate actions necessary in the event of exposure/contact with chemicals or											0			. T		
1		spill.		L	ļ								U			l		
		<ul> <li>Describe the health and environmental risks associated with chemicals used at the work</li> </ul>											0			.		
		site.		ļ							ļ							
		<ul> <li>Describe the information contained in a SDS.</li> </ul>		ļ									0		4	,		
		<ul> <li>Describe the storage and segregation process for chemicals.</li> </ul>											0					
		• Explain the minimum requirements for labeling, documentation and packing of chemicals.											0			,		
		<ul> <li>Explain what NORM is, where NORM occurs and explain the precautions to be taken to</li> </ul>											0			.		
		prevent exposure.																
140 01155 27	Fauinment Sefetu	Explain where Safety Data Sheets (SDS) are located.						·					0		++	$\rightarrow$		
140 QHSE 27	Equipment Safety	<ul> <li>Describe and give examples of various equipment guards and their purpose.</li> <li>Evaluate the baseries and presentions of working around maving (dynamic) equipment</li> </ul>											0		+			
		Explain the hazards and precautions of working around moving (uynamic) equipment.											0					
		Explain the hazards and precautions to take when working with or near low or high													-+			
		pressurized equinment											0			.		
		Explain the importance of ensuring that proper fittings (hammer unions/quick									1				++	,t-		
		connect/hydraulic fittings) are being used in piping, hoses and equipment.											0			.		
141 OHSE 29	Personal Protective Equipment (PPE)	<ul> <li>Demonstrate the proper selection and usage (donning/doffing) of PPE.</li> </ul>											0		+			
		<ul> <li>Describe different types of PPE, appropriate selection, proper usage and its limitations for</li> </ul>													1			
		various work tasks.											0			.		
		<ul> <li>Describe the proper maintenance/care and storage of PPE in accordance with the</li> </ul>											0					
		manufacturer's instructions.											U			l		
		• Explain your responsibility and the importance of wearing PPE that is appropriate for the											0			.		
		work-task.											0			<u> </u>		
142 QHSE 30	Manual Handling/Ergonomics/Posture	<ul> <li>Demonstrate how to support a load when walking with various size loads.</li> </ul>		ļ									0			,		
		<ul> <li>Demonstrate the ergonomic posture to take when physically lifting and setting a load.</li> </ul>											0					
		<ul> <li>Describe when mechanical lifting is preferred to manual lifting and why.</li> </ul>											0					
		<ul> <li>Describe where the force is concentrated on the spine when improperly lifting or setting a</li> </ul>											0			.		
		1080.											0					
		<ul> <li>Explain the company's policy and procedures on the manual handling/lifting of materials.</li> <li>Evaluate the importance of elements using both of movement prior to lifting and ensuring to the second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second s</li></ul>											U		-+			
		<ul> <li>Explain the importance of planning your path of movement prior to lifting and carrying a load</li> </ul>											0			.		
		Evolution the proper manual lifting or setting techniques to prevent back injuries as well as									+				-+			
1		<ul> <li>Explain the proper manual intring of setting techniques to prevent back injuries as well as the benefits of using mechanical lifting devices.</li> </ul>											0			,		
1		<ul> <li>Explain the value of manually "testing a load" before attempting to lift the load</li> </ul>									+		0		++			
		<ul> <li>Explain the value of manually testing a load before attempting to lift the load.</li> </ul>		1	1						1		U	L	لــــــــــــــــــــــــــــــــــــــ			

### Annex-13 : Competency Table: – Toolpusher 18/20

Position: Toolpusher		Competenc	cy level required		Pro	ficiency S	icale	GAP	Individual Development Plan
		Requi	ired Score		A	ctual Sco	re		
No Code No Functional competency	Description of competency	Awareness Application	Career Advanced Exp	t Awar	ene Applicat	i Career	Advance Expe	t	
		1 2 Pr	roficient Level Lev	ss	on	Proficien	d Level Leve		
143 QHSE 31 Confined Space Entry	<ul> <li>Describe what constitutes a confined space entry.</li> </ul>							0	
	<ul> <li>Explain how environmental conditions can negatively impact working in a confined space.</li> </ul>							0	
	<ul> <li>Explain the company's policy on confined space entry.</li> </ul>							0	
	<ul> <li>Explain the hazards associated with a confined space.</li> </ul>							0	
	<ul> <li>Explain the importance of using atmospheric monitoring equipment in a confined space.</li> </ul>							0	
	<ul> <li>Explain the procedures to take before entering a confined space.</li> </ul>							0	
	<ul> <li>Explain the procedures to take upon entering a confined space.</li> </ul>							0	
	<ul> <li>Explain the required PPE needed when working in a confined space.</li> </ul>							0	
	<ul> <li>Explain what a competent person is in the context of regulatory standards covering</li> </ul>							0	
	confined space entry.							0	
	<ul> <li>Explain what a qualified person is in the context of regulatory standards covering confined</li> </ul>							0	
	space entry.							0	
	<ul> <li>Explain what and how to identify a confined space and give some examples on your</li> </ul>							0	
	worksite.							0	
	<ul> <li>Explain why it is important to continually monitor the atmosphere of a confined space.</li> </ul>							0	
	<ul> <li>Explain your role and responsibility during a confined space rescue operation.</li> </ul>		1					0	
144 QHSE 32 Severe Weather Conditions	Demonstrate the ability to recognize operational shut down point(s).	Í						0	
	Describe actions to be taken to protect personnel during severe weather conditions.							0	
	Describe operations which may be impacted by severe weather and the actions taken to					1			
	mitigate it.							0	
	<ul> <li>Describe the process to restart operations after a severe weather event.</li> </ul>							0	
	<ul> <li>Describe the process to secure the unit, before evacuating, when a severe weather alert</li> </ul>					1		-	
	has been issued.							0	
	<ul> <li>Explain the company's policy and procedures to follow during a severe weather threat.</li> </ul>							0	
145 QHSE 33 Fire Prevention, Fire Fighting and Fire Control	<ul> <li>Demonstrate the use of portable fire extinguishers.</li> </ul>								
and Gas/Fire Detection Equipment	- · · · · · · · · · · · · · · · · · · ·							0	
	<ul> <li>Describe the company's policies and procedures for fire prevention.</li> </ul>					1		0	
	Describe the different types of portable fire extinguishers and their applications (Water.					1		_	
	Carbon Dioxide and Dry Chemical).							0	
	<ul> <li>Describe the engine shutdown procedure in the event of a gas release.</li> </ul>							0	
	<ul> <li>Describe the fire and gas detection systems, sensor locations and how they function.</li> </ul>							0	
	<ul> <li>Describe the fixed and/or portable systems used to detect the presence of Oxygen (O2).</li> </ul>					1			
	Hydrocarbon (HC) and Hydrogen Sulphide (H2S), etc.							0	
	Describe the passive fire protection systems on the unit, including their location and								
	rating.							0	
	<ul> <li>Describe the process and documentation needed for inspecting and maintaining portable</li> </ul>					1			
	fire extinguishers.							0	
	Describe the process for inspecting, maintaining, testing and calibrating the fire and gas								
	detection systems.							0	
	<ul> <li>Describe the testing and regulatory requirements for portable fire extinguishers.</li> </ul>					1		0	
	<ul> <li>Describe the three elements to complete the fire triangle.</li> </ul>							- Ŭ	
	Describe the thresholds and the actions automatically initiated on detection of HC and/or					1		11	
	H2S.							0	
	Explain the different levels of shutdown associated with the unit (if applicable)							0	
	<ul> <li>Explain the rig/unit emergency action (response) plan for a fire event.</li> </ul>					1		ŏ	
	<ul> <li>Explain the use of portable fire extinguishers.</li> </ul>					1		ŏ	
146 OHSE 34 Occupational Health Plan	Explain the process for monitoring occupational health exposures.				-			0	
	Explain the company occupational health protection plan							- li - õ	
	<ul> <li>Explain the exposures (noise, vibration, heat, etc) that are unaccentable</li> </ul>					+			
	<ul> <li>Explain the process to identify set, control and verify the exposure limits that could</li> </ul>					+			
	prevent potential acute and or chronic health hazards.							0	

# Annex-13 : Competency Table: – Toolpusher 19/20

Pos	ition:	То	oolpusher			Compete	ency level	required			Pro	ficiency S	Scale		GAP	Individual Development Pla	lan
						Re	quired Sco	ore			A	ctual Sco	re				
No	Code N	o Fur	nctional competency	Description of competency	Awareness	Application	Career	Advanced	Expert	<mark>Awarene</mark>	Applicat	ti Career	Advance	Expert			
					1	2	Proficient	Level	Level	SS	on	Proficien	d Level	Level		<del></del>	
147	QHSE 35	5 Sim	nultaneous Operations	Describe management of change and why it is important when conducting SIMOPS											0		
				operations.							]				Ŭ		
			•	Describe what constitutes a SIMOPS Plan.											0		
			•	Explain Stop Work Authority and who is responsible to initiate when a potential risk is											0		
				present.											0		
			•	Explain the elements of the SIMOPS Plan.											0		
			•	Explain the summary of operational boundaries and the difference between proceed,											<u> </u>		
				proceed with caution and stop operations.											0		
148	QHSE 36	6 Pov	wered/Manual Tools	Describe your company's powered/manual tool policy.											0		
			•	Explain the importance of inspection, maintenance and storage of powered/manual tools.											0		
			•	Explain the importance of removing defective or altered powered/manual tools.											0		
			•	Explain the importance of using the proper powered/manual tool for the task at hand.											0		
			•	Explain the required PPE and safe procedures for operating powered/manual tools.											0		

# Annex-13 : Competency Table: – Toolpusher 20/20

sition:	Toolpusher				Competency level required					Proficiency Scale					Individual Development Plan		
				Required Score				Actual Score					L I				
Code No	Functional competency		Description of competency	Awareness	Application	Career	Advanced	Expert	Awarene	Applicati Ca	areer A	Advance	Expert				
A1	Decument Central		Demonstrate how handower records are filed and maintained	-	2	Proficient	Level	Level	55		ncien (	d Level	Level	0		1 1	<u> </u>
1	Document Control		Demonstrate the ability to accurately complete the IADC Daily Drilling Report		+		+			+				0			
			Demonstrate the ability to apply action items contained in the communication document				+			++				Ŭ			
			(Alerts/Notifications/Rest Practices) through closure											0			
			Demonstrate the ability to communicate to all current operations.		+		+			1				0			
		Ì	Demonstrate the ability to complete a handover report, note and form.							1				0			
		Ì	Demonstrate the ability to order, receive, distribute and track inventory.				1			•••••		·		ō			
		ē	Demonstrate the ability to secure inventory items including dangerous goods for				1	<u></u>		† – – – – – – – – – – – – – – – – – – –					- in the second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second se		
			transportation.											0			
		•	Demonstrate the ability to store inventory items including dangerous goods.			1	1			1		1		0			
		•	Demonstrate the execution and application of a management of change request.		1	1	1			1				0			
		•	Demonstrate the handover procedure.											0			
			Describe the personnel involved in the development, implementation and maintenance of											0			
			written policy and procedure standards.		L					ļ				Ŭ,			
		•	Describe where operational documentation is maintained.					ļ						0			
		•	Explain how each business unit will utilize the quality and control system.							ļļ				0			
		•	Explain how written policy and procedure standards are implemented into the current											0			
			workforce and new hire process.											-			
		•	Explain the business units and personnel involved in developing the budget plan.							ļļ				0			
		•	Explain the business units and personnel that participate in the budget management plan.		Ļ			ļ		Ļ				0	ļ		
		•	Explain the Company policy and procedure for the handover process.											0			
		•	Explain the Company policy and procedures for the storage of inventory items including											0			
		_	dangerous goods.		Ļ			Ļ		ļļ					-		
		•	Explain the Company policy and procedures for the transportation of inventory items											0			
			Including dangerous goods.					ļ									
			Explain the Company policy and procedures on operations and HSE communications.							<u> </u>				0			
			Explain the Company policy on documentation control.											0			
			Explain the Company process for implementing and maintaining a bridging document.		+									0			
		•	Explain the Company process for issuing, distributing and responding to communication											0			
			documents (Alerts/Notifications/Best Practices).														
			Explain the Company process for maintaining the daily drilling reports.		+									0			
		•	Explain the Company process to ensure that all drawings, diagrams and procedures are											0			
		_	current.					ļ							-		
		•	Explain the Company's material inventory and parts list including the vendor's											0			
			nomenclature (name) of the part.					ļ									
			Explain the Company's policies and procedures for quality control.											0			
			Explain the Company's policy and procedures for budget management.							·}				U			
		•	Explain the Company's policy and procedures on the completion of and distribution/filing							1		1		0			
			of the IADC Daily Drilling Report.		+					+							
		•	standards											0			
			Statiualus. Explain the Company's quality and control procedures on the purchase or fabrication of				+	+		+							
		•	equipment											0			
		-	Evaluation the Company's policy and procedures for inventory management		+		+	·		++				0			
			Explain the Company's policy and procedures for inventory management.		+	t	+	<u> </u>		†				0	-		
			Explain the Company's procedure for document tracking and retention		1		1			+ +				0			
			Explain the Company's procedure for a management of change including team		+		+			t		+		, in the second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second se			
			member's roles and responsibilities.		1		1					1		0			
		-	Explain the documentation control procedure and which personnel are involved in the		+	t	1			1							
			filing of operational documentation.				1							0			
		-	Explain the importance of accurately completing the IADC Daily Drilling Report		+	1	1			1				0			
			Explain the importance of effective document control.		+	1	1			1 1				0			
			Explain the importance of ensuring that handover reports are understood and signed off		1	1	1	1		1							
		-	by outgoing and incoming personnel.				1							0			
		-	Explain the importance of following the budget plan.		1	1	1	1		TTT T		†		0	1		1
			Explain the importance of handover reports.		1	1	1	1		t min				ō	1		
		ē	Explain the importance of operations and HSE communications throughout the Company.		1	1	1	1		1				0			
		ē	Explain the process of maintaining a daily and long term logistics plan.		Τ	Ι	T	1	] [					0			
		Ē	Explain what quality and control system is used by the Company.		1	T	1	1	1	1				0			
		Ē	Explain who is responsible for completing the IADC Daily Drilling Report.		T		1			T				0			
		ē	Explain who is responsible for revising documentation and describe how to recognize the		Τ	Γ	T	1	11	T		1					
			latest version.											U			
		•	Explain who is responsible for updating the HSE policy and procedures and what is the		1	1	T		1	T							
		-	process.											0			
		•	Explain why proper review, approval and document control are essential parts of		Γ	Ι	Τ			T						T İ	
		-	management of change requests.				1					1		0			
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				Maular	- Coore	0			Antorio	Coore	•			0	-		
				waximu	in score	U			Actual	Score	0			0			