Type	Department	Scope	Issue Date	Document Ref #	Pages	Rev.	Rev. Date
Controlled	Quality Control	External	10-May-2019	TES04-DATA-PQC01v2.1			
Title	Survey Data Analysis				1 of 4	2.1	27-Oct-2022
Sub Title	**Quality Analysis – Primary Gyro Survey QC**						

Job Details

Job # Reference	**OM11185**	Date of Survey	**November 9, 2022**
Well Name	**SF-711**	Rig #	**809**

Type of Service Performed: **Gyroscopic Multishot Survey – High Angle**

Survey Information

Well Type	Deviated			Latitude	**22.07587748 °N**
Proposal Direction	126.10 °			Longitude	**55.43600368 °E**
Maximum Temperature	76 °C			Grid Correction	**0.61300808 °**
Survey from	0.00	**to**	5500.00 ft	Maximum Inclination	**35.57 °**
Survey Footage	5500.00 ft			Definitive Survey	**Inrun_09Nov2022**

Total Surveying Time Taken	1.75	hrs	
Total Rig Time Consumed	3.00	hrs	
Total Time on Rig Site	9.25	hrs	
Total Non-Productive Time [NPT]	0.00	hrs	

Process Workflow

Depth Control			PASSED
Depth System	Mechanical Depth		FUNCTIONAL
	Electronic Depth		FUNCTIONAL
Scale Factor	800.5735		APPLIED
Per-Job Zero	0.00	Post-Job Zero	4.50
Stretch Correction	0.9876		SF APPLIED

Tension Control				PASSED
Spooling System				FUNCTIONAL
Resting Load	Pre Job	245 lbs.	Post Job	165 lbs.
Max Load	1800 lbs.	Asso. Depth	5500 ft	
Weak Point	Cable Head			CHECKED
Alarms				NONE

Checklist	*Serial*	*Pre Job*	*Post Job*
Wireline Unit Systems	TU03	**PASS**	**PASS**
Equipment Conformity	Various	**PASS**	**PASS**

Checklist	*Serial*	*Pre Job*	*Post Job*
Sensor Calibration	HASS 522	**PASS**	**PASS**
Truck & Vehicle	TT03 TV03	**PASS**	**PASS**

Comparative QC Analysis

Inrun Surveys are considered to be **Definitive Surveys** & ***Outrun Surveys*** are considered ***Comparative Surveys***
The 2 Surveys are qualified by comparing their positional difference (Northing, Easting, TVD) per survey interval (Meterage)
P.S. Comparative QC Analysis does not account for systematic survey & tool errors, Gyrocompass QC Stations and Equipment Conformity are Mandatory to Quality the Survey as Definitive.

Surveys		*Measured Depth*	*TVD*	*Latitude (+N/-S)*	*Departure (+E/-W)*
Definitive Survey	**INRUN**	5500.00	5254.60	-737.68	743.25
Comparison Survey	**OUTRUN**	5500.00	5252.56	-746.64	746.85
Delta		0.00	2.04	8.96	-3.60
Comparison Qualifier		0.000	0.0004	0.0016	-0.0007
Limits		0.002	0.002	0.003	0.003
Status		**PASS**	**PASS**	**PASS**	**PASS**

Gyrocompass QC Analysis

The Gyrocompass Survey Stations are qualified based on 2 Criteria,

W(t) - Horizontal vector of Earth's Rotation Rate – The measured drift rate of the Gyroscopic Sensor sensing Azimuthal drift caused due to Earth's Rotation.

Actual **ER_h = 15.046 cosine (Latitude)**

Δ W(t) = W(t) - ER_h

High Compliance - Variance within ±1° is allowed to keep the azimuthal uncertainty ≤ ±0.1°,
Good Compliance - Variance within ±3° is allowed to keep the azimuthal uncertainty ≤ ±1°
Low Compliance - Variance within ±10° is allowed to keep the azimuthal uncertainty ≤ ±3° (Vertical Wells)
Non-Compliance – Higher Uncertainty in Azimuth readings from the Sensor for the particular survey station.

G(t) - **Vertical vector of Local Gravity** – The acceleration due to Gravity measured by the Accelerometers sensing Inclination change in the Probe.

Local Gravity g_l is calculated using the International Gravity Formula 1980 from the Latitude and Reference Elevation of the location.

g_l = 9.780327(1 + Asin²L - Bsin²2L) - 3.086x10-6H *[L – Latitude, H – Reference Elevation, A – 0.0053024, B – 0.0000058]*

Standard Gravity **g_s = 9.800665 m/s²**

Calculated **G_l = g_l x Mass of the Toolstring** (mg) (~1000 mg).

Δ TGF = G(t) – G_l

High Compliance - Variance within ± 1 mg is allowed to keep the inclination uncertainty ≤ 0.1°
Good Compliance - Variance within ± 5 mg is allowed to keep the inclination uncertainty ≤ 0.5°
Low Compliance - Variance within ± 10 mg is allowed to keep the inclination uncertainty ≤ 1° (Vertical Wells)
Non-Compliance - Higher uncertainty in Inclination readings from the Sensor for the particular survey station.

Survey : **OM11185_SF711_Rig809_Inrun**

G_l	998.278	ER_h	13.84

Measure Depth	Inclination	Azimuth	G(t)	Δ TGF	Δ TGF Comp	W(t)	Δ W(t)	Δ W(t) Comp	Status
25.00	0.32	114.09	996.30	-1.98	GOOD	13.47	-0.37	HIGH	PASS
950.00	0.22	188.49	994.80	-3.48	LOW	13.76	-0.08	HIGH	PASS
1825.00	0.39	301.00	1000.10	1.82	GOOD	14.07	0.23	HIGH	PASS
2900.00	8.11	138.59	999.10	0.82	HIGH	13.68	-0.16	HIGH	PASS
4025.00	21.44	135.55	997.40	-0.88	HIGH	13.96	0.12	HIGH	PASS

Survey Gyrocompass QC Confidence	92 %	SURVEY QUALIFIED

Survey : **OM11185_SF711_Rig809_Outrun**

G_l	998.278	ER_h	13.84

Measure Depth	Inclination	Azimuth	G(t)	Δ TGF	Δ TGF Comp	W(t)	Δ W(t)	Δ W(t) Comp	Status
25.00	0.17	159.81	998.60	0.32	HIGH	14.23	0.39	HIGH	PASS
750.00	0.27	99.35	990.60	-7.68	LOW	14.21	0.37	HIGH	PASS
1300.00	0.21	315.64	993.20	-5.08	LOW	13.87	0.03	HIGH	PASS
2200.00	0.37	229.68	997.30	-0.98	HIGH	13.94	0.10	HIGH	PASS
3125.00	10.15	133.48	997.30	-0.98	HIGH	13.79	-0.05	HIGH	PASS
3300.00	14.21	132.00	997.10	-1.18	GOOD	13.79	-0.05	HIGH	PASS
4225.00	22.96	135.33	998.70	0.42	HIGH	13.96	0.12	HIGH	PASS

Survey Gyrocompass QC Confidence	92.85 %	SURVEY QUALIFIED

Overall Survey QC Analysis

	Process Workflow	Sensor Calibration	Comparitive QC	Gyrocompass QC	Secondary QC
QC Confidence	100%	100%	100%	92.43 %	Pending
Weightage	0.5	2	2	5	0.5

Overall Survey QC Confidence	91.22%	SURVEY QUALIFIED