**DATA QUALITY ASSURANCE CONTRACT ADDENDUM**

**SECTION 1**

**DEFINITIONS**

COMPANY: The operator of the well or wells for which CONTRACTOR is performing the work.

CONTRACT: The contract between COMPANY and CONTRACTOR into which these Data Quality Assurance Requirements are incorporated.

CONTRACTOR: Any contractor performing work for COMPANY who provides, installs, calibrates, rigs up, maintains, or repairs EQUIPMENT.

EQUIPMENT: Any system, machine, device, instrument, or tool that CONTRACTOR is contracted to provide under the CONTRACT.

KEY INSTRUMENT: Any EQUIPMENT that measures, reports/displays, collects, aggregates, or transmits data which is material to the process of drilling or completing an oil, gas, or injection well.

**SECTION 2**

**QUALITY CONTROL/ASSURANCE**

2.1 CONTRACTOR shall develop and maintain quality control/ assurance documentation regarding its internal quality processes/ standards for installation, rig up, operation, and maintenance of all EQUIPMENT. CONTRACTOR shall have management of change processes to ensure proper measures are taken prior to changes to EQUIPMENT in respect to hardware/ software. CONTRACTOR management of change process shall include notification to COMPANY of relevant changes. COMPANY may request modifications subject to mutual agreement with CONTRACTOR, not to be unreasonably withheld or delayed.

2.2 CONTRACTOR shall have a competency program to ensure personnel participating in testing and measurement shall be trained in the necessary skills involved in data generation and data management. This shall include initial and ongoing personnel training, testing, and verification of knowledge transfer.

2.3 CONTRACTOR shall utilize a self-monitoring and assessment system with key performance indicators (KPIs) and reporting to determine the extent to which requirements are being met. This system shall include the resolution of all problems found in the assessments, with plans and responsibilities for appropriate follow-up.

2.4 COMPANY retains the right to audit CONTRACTOR’s processes/standards and inspect EQUPMENT as required.

**SECTION 3**

**MINIMUM ACCURACY AND REPEATABILITY STANDARDS**

COMPANY and CONTRACTOR shall jointly define KEY INSTRUMENTS and the required minimum accuracy and repeatability.

**SECTION 4**

**RELIABILITY**

CONTRACTOR shall provide KEY INSTRUMENTS that ensure proper operation in the expected operating environment of the rig. KEY INSTRUMENTS shall demonstrate a minimum of 99.9% uptime for the system and respective components. Any communication method (wired or wireless) that is part of the KEY INSTRUMENTS shall be considered in calculations of uptime. It is understood that resistance to weather and rough handling are typical oilfield design requirements. Allowances shall be made for extreme events (such as floods, tornado).

**SECTION 5**

**CALIBRATION AND FIELD VERIFICATION STANDARDS**

5.1 Calibration and field verification shall be performed according to a schedule set out in CONTRACTOR’s internal quality processes/ standards regarding each particular KEY INSTRUMENT. Results shall be made available to COMPANY prior to start of operations. COMPANY reserves the right to request more frequent verification and/ or calibration (for example, after rig up and before start of operations).

5.2 KEY INSTRUMENTS shall demonstrate precision, accuracy, and repeatability by adherence to CONTRACTOR’s processes regarding calibration. All KEY INSTRUMENTS shall be verified over the expected operating range.

5.3 Before any testing, calibration, or verification, CONTRACTOR shall supply a designated COMPANY representative with proof of accuracy and repeatability of testing tools with traceability, when requested, to NIST (National Institute of Standards) or other comparable standards institution. For new or factory reconditioned KEY INSTRUMENTS, FAT (Factory Acceptance Test) results may be provided to COMPANY as proof of accuracy.

5.4 COMPANY’s designated representative shall be notified immediately in the event that a KEY INSTRUMENT does not conform to CONTRACTOR’s standards/ processes.

5.5 CONTRACTOR shall document any KEY INSTRUMENT which is adjusted, scaled, or otherwise modified to conform to CONTRACTOR standards/ processes and shall provide details to COMPANY’s designated representative regarding the adjustment, scaling, or other modification.

**SECTION 6**

**DATA STORAGE AND TRANSMISSION (if applicable)**

6.1 CONTRACTOR represents and warrants that it is capable of storing data at intervals required by the CONTRACT. Data storage frequency shall be at the frequency of transmitted data or faster. Data retention requirements shall be defined by COMPANY and CONTRACTOR in cooperation. CONTRACTOR shall notify COMPANY not less than 30 days prior to deletion of data.

6.2 CONTRACTOR shall transmit data to COMPANY as accurately and securely as practicable in accordance with current industry practice by agreed communications protocol and data standards meeting or exceeding those specified by COMPANY. CONTRACTOR shall make its best efforts to have data transmission available at all time.

6.3 CONTRACTOR shall advise COMPANY of all data streams available for real time transmission or recorded in memory. CONTRACTOR shall electronically transmit all available real time surface and/ or downhole data as specified by COMPANY. In addition, CONTRACTOR shall provide all memory data to COMPANY in a usable format, within 30 days after finishing the job.

**SECTION 7**

**DATA TRANSFORMATION**

7.1 At the request of COMPANY, CONTRACTOR shall provide a list of scan/ poll rates, along with data transmission rates, for all measured, calculated, and transmitted data streams.

7.2 Upon execution of the CONTRACT, CONTRACTOR shall, with the exception of proprietary formulas, make available to COMPANY all information regarding methods of filtering, sampling, smoothing, decimation, or other modifications applied, for any reason, to data from any KEY INSTRUMENT which alter the data that the KEY INSTRUMENT normally provides.

7.3 CONTRACTOR shall also make available to COMPANY all data streams related to the control of the operation, including, but not limited to, any and all set points, loop-in control, and sensitivity settings.

**SECTION 8**

**INTEROPERABILITY AND DATA INTEGRATION**

**8.1 Time Synchronization**

8.1.1 CONTRACTOR shall time synchronize the setting of all KEY INSTRUMENTS provided by CONTRACTOR used for data aggregation, collection, and transmission to a COMPANY-specified time server as specified in COMPANY’s published recommended practice (e.g. hourly, daily).

8.1.2 CONTRACTOR shall deliver downhole recorded data corrected back to the time and the depth at which it was originally measured.

8.1.3 CONTRACTOR shall similarly time synchronize all downhole tools to the same COMPANY-specified time server before such downhole tools are run in the hole. Upon being returned to the surface, the time system of all downhole tools shall be compared against the COMPANY-specified time server and CONTRACTOR shall provide to COMPANY the observed time offsets.

8.1.4 CONTRACTOR shall provide surface and downhole datasets recorded against CONTRACTOR’S originally recorded time system and shall, in the event time offsets from the COMPANY-specified server have been observed, also provide similar datasets but with time stamps corrected for the observed offsets from the COMPANY-specified time server in such a manner as to correct all time recorded data back to a master time, that of the COMPANY-specified time server.

**8.2 Mnemonics and Units of Measure Standardization**

8.2.1 Mnemonics for data transmission shall be agreed upon between COMPANY and CONTRACTOR for consistency.

8.2.2 The data transmitted shall be expressed in the standard units defined by COMPANY and agreed upon with CONTRACTOR.

Exhibit 1 – Example of potential KEY INSTRUMENTS for drilling operations and their respective accuracy/repeatability.

* Rotary/Top Drive and Joint Makeup/Breakout Torque: +/-5% of full scale or +/-1000ft-lb, whichever is less
* Hookload: +/- 1000 lbs
* Rotary/Top Drive Rotational Speed +/- 2 RPM
* Stand Pipe Pressure: +/-1% of full scale or 100 psi, whichever is less
* Drilling Fluid Pump Rate: +/- 10gpm (system net)
* Drilling Fluid Tank/Pit Volume: +/-1bbl or +/-1% of pit/section vol, whichever is less
* Drilling Fluid Density +/- 0.1 ppg
* Drilling Fluid Viscosity +/- 5 cp
* Block Position: +/-0.1 ft; 0.5% of total distance

COMPANY and CONTRACTOR shall document KEY INSTRUMENTS and their accuracy and repeatability requirements.

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| Key Instrument | Accuracy requirement | Repeatability requirement |
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Exhibit 2 – Example Field Verification procedure