# WITS PRE-DEFINED RECORDS, ABREVIATIONS AND REFERENCE INFORMATION

## URL Links to WITS References:

* <http://www.petrospec-technologies.com/resource/witsappb.htm>
* <https://info.erdosmiller.com/blog/an-introduction-to-wits>
* <https://en.wikipedia.org/wiki/Wellsite_Information_Transfer_Specification>
* <http://www.petrospec-technologies.com/resource/wits_r01.htm>

## Data Type Codes

|  |  |  |
| --- | --- | --- |
| **Identifier** | **Rep Code** | **Description** |
| A | 65 | Alphanumeric |
| L | 73 | 32 bit 2's complement signed integer |
| S | 79 | 16 bit 2's complement signed integer |
| F | 128 | 32 bit IEEE single precision floating point |
| E | n/a | Engineering |
| B | n/a | Boolean |
| D | n/a | Date |
| T | n/a | Time |
| V | n/a | Variant |
| IL | n/a | Integer List |
| FL | n/a | Float List |
| EL | n/a | Engineering List |
| TL | n/a | Text List |

Examples of the format of representation codes 65, 73 and 79 may be found in the LIS handbook. Code 128 is an extension of LIS to enable the use of the more widely accepted IEEE format.

## Abbreviations and Unit Descriptions

### United States Imperial Units

|  |  |
| --- | --- |
| **Mnemonic** | **Description** |
| % | percent |
| $ | dollar |
| $/F | dollar/foot |
| API | API unit |
| B/ST | barrel/stroke |
| BBL | barrel (US = 42 gallons) |
| BPD | barrel per day |
| BPM | barrel per minute |
| CC | cubic centimeter |
| CP | centipoise |
| DEG | degree (angular) |
| DEGF | degree Fahrenheit |
| DGHF | degrees (angular) per hundred feet |
| F | feet |
| F/HR | feet per hour |
| FPM | feet per minute |
| FPS | feet per second |
| F3 | cubic feet |
| G/CC | grams per cubic centimeter |
| G/ST | gallon/stroke |
| GAL | gallon |
| GPM | gallons per minute |
| HP | horsepower |
| HR | hour |
| HSI | horsepower per square inch |
| I/32 | 1/32 inch |
| IHG | inches of mercury |
| IN | inch |
| KF/H | thousands of feet per hour |
| KFLB | thousand foot-pounds (torque) |
| KLB | thousand pounds (force) |
| LB | pound |
| LB/F | pounds per linear foot |
| MCF | thousand cubic feet |
| MCFD | thousand cubic feet per day |
| MD | millidarcies |
| MEHG | milliequivalents per hundred grams |
| MIN | minute |
| MG/L | milligrams per liter |
| MLML | milliliter per milliliter (concentration) |
| MMHO | millimhos per meter (conductivity) |
| MPH | mile per hour |
| MU | microns |
| OHMM | ohm-meter (resistivity) |
| PHSF | pounds per hundred square feet |
| PPB | pounds per barrel |
| PPG | pounds per gallon |
| PPM | parts per million |
| PSI | pounds per square inch |
| RPM | revolutions per minute |
| SEC | second |
| SPGR | specific gravity |
| SPM | strokes per minute |
| SQIN | square inch |
| V | volt |
| VOL% | volume percent |
| WT% | weight percent |

### Metric units

|  |  |
| --- | --- |
| **Mnemonic** | **Description** |
| % | percent |
| $ | dollar |
| $/M | dollar/meter |
| API | API units |
| CC | cubic centimeter |
| CP | centipoise |
| DEGC | degree Celsius |
| HR | hour |
| KDN | thousands of deca newton |
| KG/M | kilogram per meter |
| KGM3 | kilogram per cubic meter |
| KN | kilo newton |
| KNM | kilo newton meter |
| KPA | kilopascal |
| KPAS | kilopascal second |
| KPH | kilometer per hour |
| KW | kilowatt |
| KWM2 | kilowatt per square meter |
| L/M | liters per minute |
| M | meter |
| M/HR | meters per hour |
| M/S | meters per second |
| M3 | cubic meter |
| M3/D | cubic meters per day |
| M3/M | cubic meters per minute |
| M3ST | cubic meters per stroke (pump capacity) |
| MCM | thousands cubic meters |
| MCMD | thousands cubic meters per day |
| MEHG | milliequivalents per hundred grams |
| MG/L | milligrams per liter |
| MLML | milliliter per milliliter (concentration) |
| MM | millimeter |
| MM2 | square millimeter |
| MMHO | milliohms (conductivity) |
| N | newton |
| OHMM | ohm-meter (resistivity) |
| PPM | parts per million |
| RPM | revolutions per minute |
| SEC | second |
| SPM | strokes per minute |
| V | volt |

## PRE-DEFINED RECORD ITEM DESCRIPTIONS

### Record #1: General Time-Based Record

Average, minimum and maximum values for items in this record are based on the current triggering interval for this record and are reset following the transmission of this record. NOTE: Since Rate of Penetration (Item 1.13) and Weight-On-Bit values (Item 1.16 & 1.17) are only meaningful during activities where the bit is actively "on bottom", a value should only be present under certain rig activity codes, those being:

2. Drilling

 4. Reaming

5. Hole Opening

 6. Coring

20. Drilling Cement

At other times, a NULL value should be placed in these fields.

**1.1 Well Identifier**  
Number/name assigned to the well by the operator for identification purposes. This item is common to all records. This includes a four-character code identifying the SENDER.

**1.2 Sidetrack/Hole Section Number**  
Number of the sidetrack being drilled at the time the computer generated the record. Prior to having a sidetrack, this number is always 0. The sidetrack number indexes at the time drilling new formation commences (not while drilling the cement plug). This item is common to all records.

**1.3 Record Identifier**  
Logical data record type identifier. This item is common to all records and, for current Pre-Defined Records, contains a value between 1 and 25, according to the record type. Types 26 through 49 inclusive are reserved for future expansion of the Pre-Defined records. Types 50 through 80 inclusive are open for Custom user definition. NOTE that the Logical Record Type for a record is this number plus 150, thus WITS Record 1 is Logical Record Type 151, WITS Record 2 is Logical Record Type 152, etc.

**1.4 Sequence Identifier**  
Indicates the number of times this record has been generated (it is not reset to zero for a sidetrack). The computer should automatically increase the number by one each time it creates a new record. This item is common to all records. The sequence identifier in each individual record type keeps track of the count for that particular record only. Thus there is a sequence identifier for each record type used.

**1.5 Date**  
Indicates the date the computer generated this record. The date is reported as a 6 digit integer in a YYMMDD type format. e.g. 910404 would represent April 4, 1991. It is common to all records. Note that, like Time below, Universal Coordinated Time (Greenwich Mean Time) is used as the common reference. Note also that though this number should never decrease, there is no guarantee of this fact.

**1.6 Time**  
Indicates the time of day (24 hour clock), when the computer generated the record, eg. 225015 would represent 10:50:15 pm. This item is common to all records. Note that, like Date above, Universal Coordinated Time (Greenwich Mean Time) is used as the common reference.

**1.7 Activity Code**  
Code indicating what activity is currently being performed on the rig. IT IS ESSENTIAL that this information be as accurate and current as possible. Acceptible codes are shown[here](http://www.petrospec-technologies.com/resource/witsappe.htm)

**1.8 Depth Bit - Meas**  
Measured depth of the bit at the time the record is generated. This is the measured depth of the shoe when running casing or liner.

**1.9 Depth Bit - Vert**  
Vertical depth of the bit at the time the record is generated. This is the vertical depth of the shoe when running casing or liner.

**1.10 Depth Hole - Meas**  
Measured depth of the hole at the time the record is generated.

**1.11 Depth Hole - Vert**  
Vertical depth of the hole at the time the record is generated.

**1.12 Block Position**  
Measured distance of the traveling block above the rotary table.

**1.13 Rate of Penetration - Avg**  
Calculated rate of penetration, averaged over the interval, while on bottom, drilling new hole or reaming.

**1.14 Hookload - Avg**  
Measured hookload, averaged over the specified interval or connection.

**1.15 Hookload - Max**  
Maximum hookload, measured over the specified interval or connection.

**1.16 Weight on Bit - Surface, Avg**  
Measured surface weight on the bit, averaged over the interval.

**1.17 Weight on Bit - Surface, Max**  
Maximum surface weight on the bit, measured over the interval.

**1.18 Rotary Torque - Surface, Avg**  
Measured rotary torque, averaged over the interval.

**1.19 Rotary Torque - Surface, Max**  
Maximum rotary torque, measured over the interval.

**1.20 Rotary Speed - Avg**  
Measured surface rotations per minute, averaged over the interval.

**1.21 Stand Pipe Pressure - Avg**  
Measured stand pipe pressure, averaged over the interval.

**1.22 Casing (Choke) Pressure - Avg**  
Measured casing (choke) pressure, averaged over the interval.

**1.23 Pump Stroke Rate #1 - Avg**  
Stroke rate for Pump 1, averaged over the interval.

**1.24 Pump Stroke Rate #2 - Avg**  
Stroke rate for Pump 2, averaged over the interval.

**1.25 Pump Stroke Rate #3 - Avg**  
Stroke rate for Pump 3, averaged over the interval.

**1.26 Tank Volume (active) - Avg**  
Cumulative volume of mud, indicated by sensors, in all of the active compartments, averaged over the interval.

**1.27 Tank Volume Change (active)**  
Net gain/loss of mud in all the active compartments since the Tank Volume Reset Time (Item 14 of Record 11).

**1.28 Mud Flow Out % - Avg**  
Flow measured by a paddle or target type sensor and averaged over the interval, where 0 % = no flow, 100 % = full deflection of the sensor.

**1.29 Mud Flow Out - Avg**  
Measured flow rate of the mud leaving the hole, averaged over the interval.

**1.30 Mud Flow In - Avg**  
Measured/calculated flow rate of the mud entering the hole, averaged over the interval.

**1.31 Mud Density Out - Avg**  
Density of the mud leaving the hole, averaged over the interval.

**1.32 Mud Density In - Avg**  
Density of the mud entering the hole, averaged over the interval.

**1.33 Mud Temperature Out - Avg**  
Temperature of the mud leaving the hole, averaged over the interval.

**1.34 Mud Temperature In - Avg**  
Temperature of the mud entering the hole, averaged over the interval.

**1.35 Mud Conductivity Out - Avg**  
Conductivity of the mud leaving the hole, averaged over the interval.

**1.36 Mud Conductivity In - Avg**  
Conductivity of the mud entering the hole, averaged over the interval.

**1.37 Pump Stroke Count - Cumulative**  
Cumulative strokes for all pumps since reset. Normally reset at a major change in rig activity, e.g. from drilling to tripping, or as specified by the Operator.

**1.38 Lag Strokes**  
Total strokes (based on the pump(s) currently operating) being used for lagging cuttings, using either the calculation or tracer method.

**1.39 Depth Returns - Meas**  
The measured hole depth (lagged depth) that corresponds to the depth of returning mud/cuttings sample.

**1.40 Gas - Avg**  
Total combustible gas content in the returning mud sample, averaged over the interval.

**1.41-1.45 Spares 1-5**  
Spares may be used to customize the record. Since there is no formal definition of spare content the sender and receiver must agree in advance about such customization.

### Record #2: Drilling - Depth Based Record

Average, minimum and maximum values for items in this record are based on the current triggering interval for this record and are reset following the transmission of this record.

**2.1- 2.7 See item descriptions in Record 1**

**2.8 Depth Hole - Meas**  
Measured depth of the hole at the time the record is generated.

**2.9 Depth Hole - Vert**  
Vertical depth of the hole at the time the record is generated.

**2.10 Rate of Penetration - Avg**  
Calculated rate of penetration, averaged over the interval.

**2.11 Weight on Bit - Surface, Avg**  
Measured surface weight on the bit, averaged over the interval.

**2.12 Hookload - Avg**  
Measured hookload, averaged over the specified interval or connection.

**2.13 Stand Pipe Pressure - Avg**  
Measured stand pipe pressure, averaged over the interval.

**2.14 Rotary Torque - Surface, Avg**  
Measured rotary torque, averaged over the interval.

**2.15 Rotary Speed - Surface, Avg**  
Measured surface rotations per minute, averaged over the interval.

**2.16 Bit Revolutions - Cumulative**  
Measured/calculated running total of the bit revolutions while on bottom. This does not include reaming time. For a re-run bit, it is the total revolutions since the last trip.

**2.17 Mud Density In - Avg**  
Density of the mud entering the hole, averaged over the interval.

**2.18 ECD at Total Depth - Avg**  
Effective circulating density, at the current measured hole depth, of the fluids currently in the hole.

**2.19 Mud Flow In - Avg**  
Measured/calculated flow rate of the mud entering the hole, averaged over the interval.

**2.20 Mud Flow Out - Avg**  
Measured flow rate of the mud leaving the hole, averaged over the interval.

**2.21 Mud Flow Out % - Avg**  
Flow measured by a paddle or target type sensor and averaged over the interval, where 0 % = no flow, 100 % = full deflection of the sensor.

**2.22 Tank Volume (active) - Avg**  
Cumulative volume of mud, indicated by sensors, in all of the active compartments, averaged over the interval.

**2.23 Cost/Distance - Instantaneous**  
Average per distance cost to drill the interval since the last record was generated.

**2.24 Cost/Distance - Cumulative**  
Cumulative per distance cost to drill from a specified point (i.e. normally the start of the current bit run) to the current depth.

**2.25 Bit Drilled Time**  
Total number of drilling hours on the current bit. This does not include reaming time. For a re-run bit, this is only the time since the last full trip.

**2.26 Bit Drilled Distance**  
Total distance drilled for the current bit run. For a re-run bit, this is only the distance drilled since the last full trip.

**2.27 Corr. Drilling Exponent**  
Calculated drilling exponent (Jordan & Shirley, with Rehm & McClendon correction) for the interval just drilled.

**2.28-2.36 Spares 1-9**  
Spares may be used to customize the record. Since there is no formal definition of spare content the sender and receiver must agree in advance about such customization.

### Record #3: Drilling Connection Record

The average, minimum and maximum values for items in this record are based on the measurements during this connection only. The connection is defined as the time the bit first comes off bottom to the time the bit returns to bottom.

**3.1- 3.7 See item descriptions in Record 1**

**3.8 Depth Connection - Meas**  
Measured depth of the bit at the time the connection is made. This may or may not be the same as hole measured depth.

**3.9 Depth Connection - Vert**  
Vertical depth of the bit at the time the connection is made. This may or may not be the same as hole vertical depth.

**3.10 Depth Hole - Meas**  
Measured depth of the hole at the time the record is generated.

**3.11 Depth Hole - Vert**  
Vertical depth of the hole at the time the record is generated.

**3.12 Elapsed Time - Bottom to Slips**  
Time interval between coming off bottom and setting the slips, for the current connection.

**3.13 Elapsed Time - In Slips**  
Time interval between setting the slips and then releasing them, for the current connection.

**3.14 Elapsed Time - Slips to Bottom**  
Time interval between releasing the slips and returning to bottom (setting weight on the bit), for the current connection.

**3.15 Elapsed Time - Pumps Off**  
Time interval between stopping the pumps and starting them again after the connection is made.

**3.16 Running Speed Up - Max**  
Maximum upward velocity of the drillstring while picking up. This value is reset following transmission of the record. It should always be a positive number. An appropriate sampling interval should be used to eliminate spikes ( eg. 1 second).

**3.17 Running Speed Down - Max**  
Maximum downward velocity of the drillstring while running into the hole. This value is reset following transmission of the record. It should always be a positive number. An appropriate sampling interval should be used to eliminate spikes ( eg. 1 second).

**3.18 Hookload - Max**  
Maximum hookload, measured over the specified interval or connection.

**3.19 String Weight - Rotating, Avg**  
Off bottom rotating string weight. This value should be updated at specified intervals while drilling. The average should be based on the time interval of Record 1 and reset when Record 1 is generated. This value should be obtained while in an off bottom mode and represents the free-hanging total buoyed weight of the string plus blocks, compensator, etc., while the drilling fluid is circulating and the bit is rotating (if appropriate). It is included here as a reference against which the actual measured maximum hookload during the connection can be compared.

**3.20 Torque - Makeup, Max**  
Maximum torque applied while making up the connection.

**3.21 Torque - Breakout, Max**  
Maximum torque required to break out the connection.

**3.22-3.26 Spares 1-5**  
Spares may be used to customize the record. Since there is no formal definition of spare content the sender and receiver must agree in advance about such customization.

### Record #4: Hydraulics Record

Minimum and maximum values for items in this record are based on the current triggering interval of this record and are reset following the transmission of this record. Other items, including averaged values, are those used by, or are the products of, hydraulics calculations performed on the SENDER's system. For consistency, the items which are input to such calculations should be used in this record rather than averages based on the triggering interval. Such averages will depend on the SENDER's system and hydraulics programs.

**4.1- 4.7 See item descriptions in Record 1**

**4.8 Depth Hole - Meas**  
Measured depth of the hole at the time the record is generated.

**4.9 Depth Hole - Vert**  
Vertical depth of the hole at the time the record is generated.

**4.10 Depth Bit - Meas**  
Measured depth of the bit at the time the record is generated. This is the measured depth of the shoe when running casing or liner.

**4.11 Depth Bit - Vert**  
Vertical depth of the bit at the time the record is generated. This is the vertical depth of the shoe when running casing or liner.

**4.12 Mud Density In - Avg**  
Density of the mud entering the hole, averaged over the interval.

**4.13 Mud Flow In - Avg**  
Measured/calculated flow rate of the mud entering the hole, averaged over the interval.

**4.14 Stand Pipe Pressure - Avg**  
Measured standpipe pressure, averaged over the interval.

**4.15 Plastic Viscosity**  
Measured plastic viscosity of the mud. Where this is manually entered, it's value should remain, rather than being replaced by a NULL, until the next entry is made. The SENDER should enter NULL if the value is no longer valid.

**4.16 Yield Point**  
Measured yield point of the mud. Where this is manually entered, it's value should remain, rather than being replaced by a NULL, until the next entry is made. The SENDER should enter NULL if the value is no longer valid.

**4.17 Pressure Loss - Bit**  
Calculated pressure differential across the bit.

**4.18 Pressure Loss - String**  
Sum of the calculated frictional pressure losses inside the drillstring.

**4.19 Pressure Loss - Annulus**  
Sum of the calculated frictional pressure losses in the annulus.

**4.20 Pressure Loss - Surface**  
Sum of the calculated frictional pressure losses in the surface equipment.

**4.21 Pressure Loss - Mud Motor**  
Calculated/measured pressure differential across the mud motor or turbine.

**4.22 Pressure Loss - MWD Tool**  
Calculated/measured pressure differential across the MWD tool.

**4.23 Pressure Loss - % at the Bit**  
Proportion of the total system pressure loss which occurs across the bit.

**4.24 Bit Hydraulic Power**  
Calculated hydraulic horsepower generated by the flow of fluid through the bit nozzles.

**4.25 Bit Hydraulic Power per Unit Area**  
Total hydraulic horsepower, as in 4.24, divided by the cross-sectional area of the bit.

**4.26 Jet Impact Force**  
Force exerted on the bottom of the hole by the flow of fluid through the bit.

**4.27 Jet Velocity**  
Calculated velocity of the drilling fluid as it exits the bit nozzles.

**4.28 Annular Velocity - Min**  
Calculated minimum velocity of the drilling fluid in the annulus.

**4.29 Annular Velocity - Max**  
Calculated maximum velocity of the drilling fluid in the annulus.

**4.30 ECD at Total Depth**  
Effective circulating density, at the current hole measured depth, of the fluids currently in the hole.

**4.31 ECD at Bit**  
Effective circulating density, at the current bit measured depth, of the fluids currently in the hole.

**4.32 ECD at Casing Shoe**  
Effective circulating density, at the casing shoe measured depth, of the fluids currently in the hole.

**4.33 Pump Hydraulic Power**  
Hydraulic power output of the pumps.

**4.34 Calc/Observed Pressure Loss Ratio**  
Ratio of the sum of all the calculated pressure losses in the circulating system to the actual standpipe pressure, expressed as a percentage.

**4.35-4.39 Spares 1-5**  
Spares may be used to customize the record. Since there is no formal definition of spare content the sender and receiver must agree in advance about such customization.

### Record #5 : Tripping/Casing Run Time-Based Record

The average, minimum and maximum values for items in this record are based on the current triggering interval of this record and are reset following the transmission of this record. The time interval for this record should be reset at the instant the pipe is removed from slips to commence pulling/running a new stand.

**5.1- 5.7 See item descriptions in Record 1**

**5.8 Depth Bit - Meas**  
Measured depth of the bit at the time the record is generated. This is the measured depth of the shoe when running casing or liner.

**5.9 Depth Bit - Meas**  
Vertical depth of the bit at the time the record is generated. This is the vertical depth of the shoe when running casing or liner.

**5.10 Depth Hole - Meas**  
Measured depth of the hole at the time the record is generated.

**5.11 Depth Hole - Vert**  
Vertical depth of the hole at the time the record is generated.

**5.12 Trip Number**  
Sequential number assigned to all trips, as specified by the Operator.

**5.13 In-Slips Status**  
In- or Out-of slips condition. "I" indicates that the slips are set, "O" indicates that the slips are out, at the time that the record is generated.

**5.14 Hookload - Avg**  
Measured hookload, averaged over the specified interval or connection.

**5.15 Block Position**  
Measured distance above the rotary table of the traveling block.

**5.16 Running Speed Up - Max**  
Maximum upward velocity of the drillstring while picking up. This value is reset following transmission of the record. It should always be a positive number. An appropriate sampling interval should be used to eliminate spikes ( eg. 1 second).

**5.17 Running Speed Down - Max**  
Maximum downward velocity of the drillstring while running into the hole. This value is reset following transmission of the record. It should always be a positive number. An appropriate sampling interval should be used to eliminate spikes ( eg. 1 second).

**5.18 Fill/Gain Volume - Observed, Cumulative**  
Cumulative volume of mud gained or lost from the trip tank on the current trip.

**5.19-5.23 Spares 1-5**  
Spares may be used to customize the record. Since there is no formal definition of spare content the sender and receiver must agree in advance about such customization.

### Record #6 : Tripping/Casing Run Connection Based Record

Average, minimum and maximum values for items in this record are based on the current "connection" which is defined to begin at the time that the pipe is removed from the slips and are reset at the start of the next "connection".

**6.1- 6.7 See item descriptions in Record 1**

**6.8 Depth Bit - Meas**  
Measured depth of the bit at the time the record is generated. This is the measured depth of the shoe when running casing or liner.

**6.9 Depth Bit - Vert**  
Vertical depth of the bit at the time the record is generated. This is the vertical depth of the shoe when running casing or liner.

**6.10 Depth Hole - Meas**  
Measured depth of the hole at the time of the record is generated.

**6.11 Depth Hole - Vert**  
Vertical depth of the hole at the time of the record is generated.

**6.12 Trip Number**  
Sequential number assigned to all trips, as specified by the Operator.

**6.13 Connections Done**  
Number of connections made on the current trip.

**6.14 Connections Remaining**  
Number of connections remaining on the current trip.

**6.15 Elapsed Time - In Slips**  
Elapsed in-slips time for the current connection.

**6.16 Elapsed Time - Out of Slips**  
Elapsed out-of-slips time for the current connection.

**6.17 Running Speed Up - Max**  
Maximum upward velocity of the drillstring while picking up. This value is reset following transmission of the record. It should always be a positive number. An appropriate sampling interval should be used to eliminate spikes ( eg. 1 second).

**6.18 Running Speed Up - Avg**  
Average upward velocity of the drillstring while picking up. This value is reset following transmission of the record. It should always be a positive number. An appropriate sampling interval should be used to eliminate spikes ( eg. 1 second).

**6.19 Running Speed Down - Max**  
Maximum downward velocity of the drillstring while running into the hole. This value is reset following transmission of the record. It should always be a positive number. An appropriate sampling interval should be used to eliminate spikes ( eg. 1 second).

**6.20 Running Speed Down - Avg**  
Average downward velocity of the drillstring while running into the hole. This value is reset following transmission of the record. It should always be a positive number. An appropriate sampling interval should be used to eliminate spikes ( eg. 1 second).

**6.21 Hookload - Max**  
Maximum hookload, measured over the specified interval or connection.

**6.22 Hookload - Min**  
Minimum hookload, measured over the specified interval or connection, while not in slips.

**6.23 Hookload - Avg**  
Average hookload measured during the connection.

**6.24 Torque - Makeup, Max**  
Maximum torque applied to makeup the connection.

**6.25 Torque - Breakout, Max**  
Maximum torque required to break out the connection.

**6.26 Fill/Gain Volume - Observed**  
Measured volume of mud gained in, or lost from, the trip tank due to the movement of the current stand or joint.

**6.27 Fill/Gain Volume - Expected**  
Calculated volume per stand or joint which should be gained or lost from the trip tank due to the movement of the pipe.

**6.28 Fill/Gain Volume - Observed, Cumulative**  
Cumulative volume of mud gained or lost from the trip tank on the current trip.

**6.29 Fill/Gain Volume - Expected, Cumulative**  
Calculated cumulative volume of mud which should have been gained or lost from the trip tank on the current trip.

**6.30- 6.34 Spares 1-5**  
Spares may be used to customize the record. Since there is no formal definition of spare content the sender and receiver must agree in advance about such customization.

### Record #7: Survey/Directional Record

**7.1- 7.7 See item descriptions in Record 1**

**7.8 Depth Survey/Reading - Meas**  
Measured depth of the directional sensor at the time the measurement was taken.

**7.9 Depth Survey/Reading - Vert**  
Vertical depth of the directional sensor at the time the measurement was taken.

**7.10 Pass Number**  
Sequential number assigned to repeat survey runs over the same hole interval. Survey runs may be a mix of MWD-derived surveys, multishot, etc. The original hole should have a pass number of 0. Any new hole drilled should have a pass number of 0. Repeat survey sections in a hole should have the pass number incremented by 1. Except for returning to 0 for new sections, the pass number will always increment for each repeat section.

As an example:

A hole is drilled from 2000m to 4000m, using MWD-derived survey measurements, with pass number 0. It is decided to run a multishot survey over the section. The pass number is 1 for these surveys. New hole is again drilled from 4000m, once again using an MWD tool for survey measurements. The pass number returns to 0. After drilling to 5000m, it is decided to run another multishot survey from 2000m to 5000m. The pass number for this section is 2. Thus, for the interval 2000m to 5000m, the following passes exist: From 2000 - 4000m, pass 0, 1, 2 4000 - 5000m, pass 0, 2

**7.11 Depth Hole - Meas**  
Measured depth of the hole at the time the record is generated.

**7.12 Svy Type**  
Type of instrument used to take the measurement. Suggested types are:

MWD           (1)     (Measurement While Drilling)

Mag-SS        (2)     (Magnetic Single Shot)

Mag-MS        (3)     (Magnetic Multi Shot)

Gyr-Free      (4)     (Gyro-Free)

Gyr-Rate      (5)     (Gyro-Rate Integrating )

Inertial      (6)     (Inertial Navigation System)

Other types should be agreed upon between the two parties.

**7.13 Svy Inclination**  
Borehole inclination measured by the directional sensor.

**7.14 Svy Azimuth - Uncorrected**  
Borehole azimuth measured by the directional sensor relative to local magnetic north.

**7.15 Svy Azimuth - Corrected**  
Borehole azimuth measured by the directional sensor relative to true north, i.e. corrected for declination.

**7.16 Svy Magnetic Tool Face**  
Magnetic tool face measured by the directional sensor.

**7.17 Svy Gravity Tool Face**  
Gravity tool face measured by the directional sensor.

**7.18 Svy North-South Position**  
Distance, at the survey depth, that the axis of the hole lies north or south of the axis of the pre-defined surface reference point. A positive number denotes north, a negative number south.

**7.19 Svy East-West Position**  
Distance, at the survey depth, that the axis of the hole lies east or west of the axis of the pre-defined surface reference point. A positive number denotes east, a negative number west.

**7.20 Svy Dog Leg Severity**  
Rate of change of hole angle and/or direction evaluated between the current survey point and the next shallowest survey point (for the current pass number).

**7.21 Svy Rate of Walk**  
Measurement of the tendency of the drillstring to be displaced to the right or left of the intended well path.

**7.22- 7.26 Spares 1-5**  
Spares may be used to customize the record. Since there is no formal definition of spare content the sender and receiver must agree in advance about such customization.

### Record #8: Measurement While Drilling - Formation Evaluation Record

Only "on-bottom" data are included in averages when the record is set for depth or depth/time triggering. All data points are used when the record is time triggered only.

**8.1- 8.7 See item descriptions in Record 1**

**8.8 Depth Hole - Meas**  
Measured depth of the hole at the time the record is generated.

**8.9 Depth Hole - Vert**  
Vertical depth of the hole at the time the record is generated.

**8.10 Depth Bit - Meas**  
Measured depth of the bit at the time the record is generated.

**8.11 Depth Bit - Vert**  
Vertical depth of the bit at the time the record is generated.

**8.12 Pass Number**  
Sequential number assigned to repeated MWD logging runs over the same hole interval. The original hole should have a pass number of 0. Any new hole drilled should have a pass number of 0. Repeat logging sections in a hole should have the pass number incremented by 1. Except for returning to 0 for new sections, the pass number will always increment for each repeat section. As an example:

A hole is drilled from 2000m to 4000m with pass number 0. It is decided to repeat log the section from 3500m to 4000m. The pass number is 1 for this section. New hole is again drilled from 4000m. The pass number returns to 0. After drilling to 5000m, it is decided to relog the section from 3500m to 5000m. The pass number for this section is 2. Following this, another repeat log is taken from 4800m to 5000m. This pass is number 3.

Thus, for the interval 2000m to 5000m, the following passes exist:

        From    2000 - 3500m, pass 0

               3500 - 4000m, pass 0, 1, 2

               4000 - 4800m, pass 0, 2

               4800 - 5000m, pass 0, 2, 3

**8.13 Depth Resistivity 1 Sensor - Meas**  
Measured depth of Resistivity sensor #1.

**8.14 Depth Resistivity 1 Sensor - Vert**  
Vertical depth of Resistivity sensor #1.

**8.15 Resistivity 1 Reading**  
Value of Resistivity sensor #1.

**8.16 Resistivity 1 - Borehole Corr**  
Value of Resistivity sensor #1 corrected for borehole effects.

**8.17 Depth Resistivity 2 Sensor - Meas**  
Measured depth of Resistivity sensor #2.

**8.18 Depth Resistivity 2 Sensor - Vert**  
Vertical depth of Resistivity sensor #2.

**8.19 Resistivity 2 Reading**  
Value of Resistivity sensor #2.

**8.20 Resistivity 2 - Borehole Corr**  
Value of Resistivity sensor #2 corrected for borehole effects.

**8.21 Depth Gamma Ray 1 Sensor - Meas**  
Measured depth of Gamma Ray sensor #1.

**8.22 Depth Gamma Ray 1 Sensor - Vert**  
Vertical depth of Gamma Ray sensor #1.

**8.23 Gamma Ray 1 Reading**  
Value of Gamma Ray sensor #1.

**8.24 Gamma Ray 1 - Borehole Corr**  
Value of Gamma Ray sensor #1 corrected for borehole effects (normalized).

**8.25 Depth Gamma Ray 2 Sensor - Meas**  
Measured depth of Gamma Ray sensor #2.

**8.26 Depth Gamma Ray 2 Sensor - Vert**  
Vertical depth of Gamma Ray sensor #2.

**8.27 Gamma Ray 2 Reading**  
Value of Gamma Ray sensor #2.

**8.28 Gamma Ray 2 - Borehole Corr**  
Value of Gamma Ray sensor #2 corrected for borehole effects (normalized).

**8.29 Depth Por 1 Sensor - Meas**  
Measured depth of Porosity sensor #1.

**8.30 Depth Por 1 Sensor - Vert**  
Vertical depth of Porosity sensor #1.

**8.31 Porosity Tool 1 Reading**  
Value of Porosity sensor #1.

**8.32 Depth Por 2 Sensor - Meas**  
Measured depth of Porosity sensor #2.

**8.33 Depth Por 2 Sensor - Vert**  
Vertical depth of Porosity sensor #2.

**8.34 Porosity Tool 2 Reading**  
Value of Porosity sensor #2.

**8.35 Downhole Fluid Temperature - Ann**  
Average fluid temperature measured outside the MWD collar.

**8.36 Downhole Fluid Temperature - Pipe**  
Average fluid temperature measured inside the MWD collar.

**8.37 Downhole Fluid Resistivity - Ann**  
Average fluid resistivity measured outside the MWD collar.

**8.38 Downhole Fluid Resistivity - Pipe**  
Average fluid resistivity measured inside the MWD collar.

**8.39 Depth Form Density Sensor - Meas**  
Measured depth of the Formation Density sensor.

**8.40 Depth Form Density Sensor - Vert**  
Vertical depth of the Formation Density sensor.

**8.41 Formation Density**  
Value of Formation Density measured by the MWD tool.

**8.42 Depth Caliper Sensor - Meas**  
Measured depth of the Caliper sensor.

**8.43 Depth Caliper Sensor - Vert**  
Vertical depth of the Caliper sensor.

**8.44 Caliper**  
Value of the Caliper sensor.

**8.45 Pore Pressure Grad - MWD**  
Computed formation pore pressure gradient, based exclusively on MWD readings, for the current depth.

**8.46 Frac Pressure Grad - MWD**  
Computed formation fracture pressure gradient, based exclusively on MWD readings, for the current depth.

**8.47- 8.55 Spares 1-9**  
Spares may be used to customize the record. Since there is no formal definition of spare content the sender and receiver must agree in advance about such customization.

### Record #9: Measurement While Drilling - Mechanical Record

Only "on-bottom" data are included in averages when the record is set for depth or depth/time triggering. All data points are used when the record is time triggered only.

**9.1- 9.7 See item descriptions in Record 1**

**9.8 Depth Hole - Meas**  
Measured depth of the hole at the time the record is generated.

**9.9 Depth Hole - Vert**  
Vertical depth of the hole at the time the record is generated.

**9.10 Depth Bit - Meas**  
Measured depth of the bit at the time the record is generated.

**9.11 Depth Bit - Vert**  
Vertical depth of the bit at the time the record is generated.

**9.12 Pass Number**  
Sequential number assigned to repeated MWD logging runs over the same hole interval. The original hole should have a pass number of 0. Any new hole drilled should have a pass number of 0. Repeat logging sections in a hole should have the pass number incremented by 1. Except for returning to 0 for new sections, the pass number will always increment for each repeat section. As an example:

A hole is drilled from 2000m to 4000m with pass number 0. It is decided to repeat log the section from 3500m to 4000m. The pass number is 1 for this section. New hole is again drilled from 4000m. The pass number returns to 0. After drilling to 5000m, it is decided to relog the section from 3500m to 5000m. The pass number for this section is 2. Following this, another repeat log is taken from 4800m to 5000m. This pass is number 3.

Thus, for the interval 2000m to 5000m, the following passes exist:

        From    2000 - 3500m,    pass 0

               3500 - 4000m,    pass 0, 1, 2

               4000 - 4800m,    pass 0, 2

               4800 - 5000m,    pass 0, 2, 3

**9.13 Bottom-Hole Annulus Press**  
Pressure measured in the annulus, averaged over the interval.

**9.14 Bottom-Hole Internal Press**  
Pressure measured inside the drillstring, averaged over the interval.

**9.15 Downhole Weight on Bit - Avg**  
Measured downhole weight on bit, averaged over the interval.

**9.16 Downhole Weight on Bit - Max**  
Maximum measured downhole weight on bit over the interval.

**9.17 Downhole Torque - Avg**  
Measured downhole (bit) torque, averaged over the interval.

**9.18 Downhole Torque - Max**  
Maximum measured downhole (bit) torque recorded over the interval.

**9.19 Downhole Motor RPM**  
Average rotary speed of a downhole motor as measured by a MWD tool

over the interval.

**9.20 Alternator Voltage**  
Alternator voltage of the MWD tool averaged over the interval.

**9.21- 9.29 Spares 1-9**  
Spares may be used to customize the record. Since there is no formal definition of spare content the sender and receiver must agree in advance about such customization.

### Record #10: Pressure Evaluation Record

**10.1- 10.7 See item descriptions in Record 1**

**10.8 Depth Hole - Meas**  
Measured depth of the hole at the time the record is generated.

**10.9 Depth Hole - Vert**  
Vertical depth of the hole at the time the record is generated.

**10.10 Depth Sample - Meas**  
Measured depth corresponding to the origin of the lagged cuttings.

**10.11 Depth Sample - Vert**  
Vertical depth corresponding to the origin of the lagged cuttings.

**10.12 Est. Form. Pore Press Grad.**  
Estimated formation pore pressure gradient at this depth, expressed as equivalent mud density.

**10.13 Est. Form. Frac Press Grad.**  
Estimated formation fracture pressure gradient at this depth, expressed as equivalent mud density.

**10.14 Est. Form. Overburden Pressure Grad.**  
Estimated overburden pressure gradient at this depth, expressed as equivalent mud density.

**10.15 Est. Kick Tolerance**  
Estimated kick tolerance at this depth, based on zero influx and no trip margin (unless specified by the Operator).

**10.16 Max. Permitted SICP - Init**  
Initial maximum allowable Shut-In Casing Pressure at this depth, with the present mud density (assuming no fluid influx into the borehole).

**10.17 Connection Gas - Avg**  
Average value of connection gas since the last record was generated.

**10.18 Connection Gas - Max**  
Maximum value of connection gas since the last record was generated.

**10.19 Connection Gas - Last connection**  
Value of the last connection gas recorded.

**10.20 Last Trip Gas**  
Trip gas recorded after the last trip.

**10.21 Shale Density**  
The density of a representative shale sample taken from the cuttings, measured using a shale density kit.

**10.22 Cuttings CEC**  
The shale factor or cation exchange capacity of a shale or clay sample, measured using the methylene blue titration method.

**10.23 Cavings %**  
That proportion of the cuttings which are interpreted to be cavings.

**10.24 Corrected Drilling Exponent**  
The calculated drilling exponent (corrected) at the time the record is generated. (Jordan & Shirley drilling exponent, with Rehm & McClendon correction for mud density/ECD)

**10.25- 10.33 Spares 1-9**  
Spares may be used to customize the record. Since there is no formal definition of spare content the sender and receiver must agree in advance about such customization.

### Record #11: Mud Tank Volumes Record

Average, minimum and maximum values for items in this record are based on the current triggering interval for this record and are reset following the transmission of this record.

**11.1- 11.7 See item descriptions in Record 1**

**11.8 Depth Hole - Meas**  
Measured depth of the hole at the time the record is generated.

**11.9 Depth Hole - Vert**  
Vertical depth of the hole at the time the record is generated.

**11.10 Tank Volume - Total, Avg**  
Total volume of mud, indicated by sensors in all the compartments, averaged over the interval.

**11.11 Tank Volume - Active, Avg**  
Total volume of mud, indicated by sensors in all the ACTIVE compartments, averaged over the interval.

**11.12 Tank Volume Change - Total**  
Net gain/loss of mud in all the compartments since the Tank Volume Reset Time indicated in 11.14.

**11.13 Tank Volume Change - Active**  
Net gain/loss of mud in all the active compartments since the Tank Volume Reset Time indicated in 11.14.

**11.14 Tank Volume Reset Time**  
Time that the tank volume change variables (11.12 & 11.13) were last zeroed. The time displayed is based on a 24 hour clock. e.g. 225015 represents 10:50:15 pm. Dates and times are in Universal Coordinated Time (Greenwich Mean Time).

**11.15- 11.28 Tanks 1-14 Volumes**  
Volume of mud, indicated by sensors, in each of the designated compartments, averaged over the interval.

**11.29 Trip Tank 1 Volume**  
Current volume of mud, indicated by a sensor, in trip tank 1 when the record is generated.

**11.30 Trip Tank 2 Volume**  
Current volume of mud, indicated by a sensor, in trip tank 2 when the record is generated.

**11.31- 11.35 Spares 1-5**  
Spares may be used to customize the record. Since there is no formal definition of spare content the sender and receiver must agree in advance about such customization.

### Record #12: Chromatograph Gases Cycle Based Record

**12.1- 12.7 See item descriptions in Record 1**

**12.8 Depth Chrom Sample - Meas**  
Measured hole depth corresponding to origin of the lagged sample.

**12.9 Depth Chrom Sample - Vert**  
Vertical hole depth corresponding to origin of the lagged sample.

**12.10 Date Chrom Sample**  
Date that the sample was processed by the chromatograph, e.g. 910404 represents April 4, 1991. Dates and times are in Universal Coordinated Time (Greenwich Mean Time). This date is normally part of an integrator report generated at the end of processing chromatograph signals.

**12.11 Time Chrom Sample**  
Time based on a 24 clock, that the sample was processed by the chromatograph. e.g. 225015 represents 10:50:15 pm. Dates and times are in Universal Coordinated Time (Greenwich Mean Time). This time is normally part of an integrator report generated at the end of processing chromatograph signals.

**12.12 Methane - C1**  
Methane content of the sample.

**12.13 Ethane - C2**  
Ethane content of the sample.

**12.14 Propane - C3**  
Propane content of the sample.

**12.15 Iso-Butane - IC4**  
Iso-Butane content of the sample.

**12.16 Nor-Butane - NC4**  
Nor-Butane content of the sample.

**12.17 Iso-Pentane - IC5**  
Iso-Pentane content of the sample.

**12.18 Nor-Pentane - NC5**  
Nor-Pentane content of the sample.

**12.19 Neo-Pentane - EC5**  
Neo-Pentane content of the sample.

**12.20 Iso-Hexane - IC6**  
Iso-Hexane content of the sample.

**12.21 Nor-Hexane - NC6**  
Nor-Hexane content of the sample.

**12.22 Carbon Dioxide Content**  
Carbon dioxide content of the sample.

**12.23 Acetylene**  
Acetylene content of the sample.

**12.24- 12.28 Spares 1-5**  
Spares may be used to customize the record. Since there is no formal definition of spare content the sender and receiver must agree in advance about such customization.

### Record #13: Chromatograph Gases Depth Based Record

Average, minimum and maximum values for items in this record are based on the number of chromatograph cycles within the triggering interval for this record and are reset following the transmission of this record. If the depth trigger is so small that no new cycles have occurred when this record is due, it is not sent.

**13.1- 13.7 See item descriptions in Record 1**

**13.8 Depth Returns - Meas**  
Measured hole depth (lagged depth) corresponding to the depth of the returning mud/cuttings sample.

**13.9 Depth Returns - Vert**  
Vertical hole depth (lagged depth) corresponding to the depth of the returning mud/cuttings sample.

**13.10 Methane-C1 - Avg**  
Average methane content of the returning mud sample, over the interval.

**13.11 Methane-C1 - Min**  
Minimum methane content of the returning mud sample, over the interval.

**13.12 Methane-C1 - Max**  
Maximum methane content of the returning mud sample, over the interval.

**13.13 Ethane-C2 - Avg**  
Average ethane content of the returning mud sample, over the interval.

**13.14 Ethane-C2 - Min**  
Minimum ethane content of the returning mud sample, over the interval.

**13.15 Ethane-C2 - Max**  
Maximum ethane content of the returning mud sample, over the interval.

**13.16 Propane-C3 - Avg**  
Average propane content of the returning mud sample, over the interval.

**13.17 Propane-C3 - Min**  
Minimum propane content of the returning mud sample, over the interval.

**13.18 Propane-C3 - Max**  
Maximum propane content of the returning mud sample, over the interval.

**13.19 Iso-Butane-IC4 - Avg**  
Average iso-butane content of the returning mud sample, over the interval.

**13.20 Iso-Butane-IC4 - Min**  
Minimum iso-butane content of the returning mud sample, over the interval.

**13.21 Iso-Butane-IC4 - Max**  
Maximum iso-butane content of the returning mud sample, over the interval.

**13.22 Nor-Butane-NC4 - Avg**  
Average normal butane content of the returning mud sample, over the interval.

**13.23 Nor-Butane-NC4 - Min**  
Minimum normal butane content of the returning mud sample, over the interval.

**13.24 Nor-Butane-NC4 - Max**  
Maximum normal butane content of the returning mud sample, over the interval.

**13.25 Iso-Pentane-IC5 - Avg**  
Average iso-pentane content of the returning mud sample, over the interval.

**13.26 Iso-Pentane-IC5 - Min**  
Minimum iso-pentane content of the returning mud sample, over the interval.

**13.27 Iso-Pentane-IC5 - Max**  
Maximum iso-pentane content of the returning mud sample, over the interval.

**13.28 Nor-Pentane-nC5 - Avg**  
Average normal pentane content of the returning mud sample, over the interval.

**13.29 Nor-Pentane-nC5 - Min**  
Minimum normal pentane content of the returning mud sample, over the interval.

**13.30 Nor-Pentane-NC5 - Max**  
Maximum normal pentane content of the returning mud sample, over the interval.

**13.31 Neo-Pentane - Avg**  
Average neo-pentane content of the returning mud sample, over the interval.

**13.32 Neo-Pentane - Min**  
Minimum neo-pentane content of the returning mud sample, over the interval.

**13.33 Neo-Pentane - Max**  
Maximum neo-pentane content of the returning mud sample, over the interval.

**13.34 Iso-Hexane-IC6 - Avg**  
Average iso-hexane content of the returning mud sample, over the interval.

**13.35 Iso-Hexane-IC6 - Min**  
Minimum iso-hexane content of the returning mud sample, over the interval.

**13.36 Iso-Hexane-IC6 - Max**  
Maximum iso-hexane content of the returning mud sample, over the interval.

**13.37 Nor-Hexane-NC6 - Avg**  
Average normal hexane content of the returning mud sample, over the interval.

**13.38 Nor-Hexane-NC6 - Min**  
Minimum normal hexane content of the returning mud sample, over the interval.

**13.39 Nor-Hexane-NC6 - Max**  
Maximum normal hexane content of the returning mud sample, over the interval.

**13.40 Carbon Dioxide - Avg**  
Average carbon dioxide content of the returning mud sample, over the interval.

**13.41 Carbon Dioxide - Min**  
Minimum carbon dioxide content of the returning mud sample, over the interval.

**13.42 Carbon Dioxide - Max**  
Maximum carbon dioxide content of the returning mud sample, over the interval.

**13.43 Acetylene - Avg**  
Average acetylene content of the returning mud sample, over the interval.

**13.44- 13.48 Spares 1-5**  
Spares may be used to customize the record. Since there is no formal definition of spare content the sender and receiver must agree in advance about such customization.

### Record #14: Continuous Lagged Mud Properties Record

If the record is depth-triggered (on returns depth) or depth/time triggered:  
Average, minimum and maximum values for items in this record are based on the current depth triggering interval for this record and are reset following the depth-triggered transmission of this record.

If the record is time-triggered only:  
Average, minimum and maximum values for items in this record are based on the current time triggering interval for this record and are reset following the transmission of this record.

**14.1- 14.7 See item descriptions in Record 1**

**14.8 Depth Returns - Meas**  
Measured hole depth (lagged depth) corresponding to the origin of the returning mud/cuttings sample.

**14.9 Depth Returns - Vert**  
Vertical hole depth (lagged depth) corresponding to the origin of the returning mud/cuttings sample.

**14.10 Mud Density In - Lagd**  
For the returning mud sample, the density when it entered the hole. For use in differential comparisons.

**14.11 Mud Density Out - Avg**  
Average density of the returning mud sample.

**14.12 Mud Temperature In - Lagd**  
For the returning mud sample, the temperature when it entered the hole. For use in differential comparisons.

**14.13 Mud Temperature Out - Avg**  
Average temperature of the returning mud sample.

**14.14 Mud Conductivity In - Lagd**  
For the returning mud sample, the conductivity when it entered the hole. For use in differential comparisons.

**14.15 Mud Conductivity Out - Avg**  
Average conductivity of the returning mud sample.

**14.16 Hyd.Sulfide Hazard Potential - Avg**  
Total amount (in ppm) of H2S that could exist in the air above the mud, based on the measured pH and pHS (14.17 & 14.18) concentrations.

**14.17 Hyd.Sulfide pH - Avg**  
pH (percent concentration of H+ in the mud - ie. acidity/alkalinity) of the mud, as measured by a continuous monitoring sensor. Range is 0 - 19.9.

**14.18 Hyd.Sulfide pHS - Avg**  
pHS (percent concentration of HS- ) present in the mud, as measured by a continuous monitoring sensor.

**14.19 Gas In - Lagd**  
For the returning mud sample, the flammable gas content when it entered the hole. For use in differential comparisons.

**14.20 Gas - Avg**  
Total combustible gas content in the returning mud sample, averaged over the interval.

**14.21 Gas - Maximum**  
Maximum combustible gas content in the returning mud sample, measured over the interval.

**14.22 Carbon Dioxide - Avg**  
Carbon dioxide content of the returning mud sample, averaged over the interval.

**14.23 Hyd. Sulfide - Avg**  
Hydrogen sulfide content of the returning mud sample, averaged over the interval.

**14.24 Hyd. Sulfide - Max**  
Maximum hydrogen sulfide content of the returning mud sample, measured over the interval.

**14.25- 14.29 Spares 1-5**  
Spares may be used to customize the record. Since there is no formal definition of spare content the sender and receiver must agree in advance about such customization.

### Record #15: Cuttings/Lithology Record

**15.1- 15.7 See item descriptions in Record 1**

**15.8 Depth Sample - Meas**  
Measured depth of the hole corresponding to the origin of the lagged cuttings.

**15.9 Depth Sample - Vert**  
Vertical depth of the hole corresponding to the origin of the lagged cuttings.

**15.10 Description Type**  
Indicates whether the description is for cuttings, core or sidewall core samples:

        Cuttings       (1)

        Core           (2)

        Sidewall       (3)

**15.11 Lith 1 Type**  
Type of the primary lithology present in the sample. NOTE : If English abbreviations are to be used, it is recommended that those published by the AAPG be followed (Reference 4)

**15.12 Lith 1 %**  
Percentage of the sample which is composed of lithology 1.

**15.13 Lith 1 Classification**  
Classification of lithology 1.

**15.14 Lith 1 Color**  
Color of lithology 1 present in the sample.

**15.15 Lith 1 Texture**  
Texture of lithology 1 present in the sample.

**15.16 Lith 1 Hardness**  
Hardness or induration observed in lithology 1.

**15.17 Lith 1 Grain Size**  
Average grain size observed lithology 1.

**15.18 Lith 1 Roundness**  
Degree of grain rounding observed in lithology 1.

**15.19 Lith 1 Sorting**  
Degree of sorting observed in lithology 1.

**15.20 Lith 1 Matrix/Cement**  
Type of matrix or cementing materials observed in lithology 1.

**15.21 Lith 1 Accessories**  
Chief accessory associated with lithology 1 in the sample.

**15.22 Lith 1 Porosity**  
Measured porosity of lithology 1.

**15.23 Lith 1 Permeability**  
Measured permeability of lithology 1.

**15.24 Lith 2 Type**  
Type of the secondary lithology present in the sample.

**15.25 Lith 2 %**  
Percentage of the sample which is composed of lithology 2.

**15.26 Lith 2 Classification**  
Classification of lithology 2.

**15.27 Lith 2 Color**  
Color of lithology 2 present in the sample.

**15.28 Lith 2 Texture**  
Texture of lithology 2 present in the sample.

**15.29 Lith 2 Hardness**  
Hardness or induration observed in lithology 2.

**15.30 Lith 2 Grain Size**  
Average grain size observed in lithology 2.

**15.31 Lith 2 Roundness**  
Degree of grain rounding observed in lithology 2.

**15.32 Lith 2 Sorting**  
Degree of sorting observed in lithology 2.

**15.33 Lith 2 Matrix/Cement**  
Type of matrix or cementing materials observed in lithology 2.

**15.34 Lith 2 Accessories**  
Chief accessory associated with lithology 2 in the sample.

**15.35 Lith 2 Porosity**  
Measured porosity of lithology 2.

**15.36 Lith 2 Permeability**  
Measured permeability of lithology 2 .

**15.37 Lith 3 Type**  
Type of lithology 3 present in the sample.

**15.38 Lith 3 %**  
Percentage of the sample which is composed of lithology 3.

**15.39 Lith 3 Classification**  
Classification of lithology 3.

**15.40 Lith 4 Type**  
Type of lithology 4 present in the sample.

**15.41 Lith 4 %**  
Percentage of the sample which is composed of lithology 4.

**15.42 Lith 4 Classification**  
Classification of lithology 4.

**15.43 Lith 5 Type**  
Type of lithology 5 present in the sample.

**15.44 Lith 5 %**  
Percentage of the sample which is composed of lithology 5.

**15.45 Lith 5 Classification**  
Classification of lithology 5.

**15.46 Fossils**  
Amount and/or type of fossils observed in the sample, especially if markers.

**15.47 Composite Show**  
Overall hydrocarbon show quality, if any. e.g. GOOD, FAIR, TRACE, NONE, etc.

**15.48 Bulk Density**  
Density of a representative sample taken from the cuttings, using the bulk density method.

**15.49 Cuttings Gas**  
Amount of flammable gas released from a fixed volume of cuttings following pulverization in a blender.

**15.50 Calcimetry Calcite %**  
Measured percentage of calcite present in the sample.

**15.51 Calcimetry Dolomite %**  
Measured percentage of dolomite present in the sample.

**15.52 Cuttings CEC**  
Shale factor, or cation exchange capacity, of a shale or clay sample, using the methylene blue titration method.

**15.53 Cavings %**  
Proportion of the cuttings which are interpreted to be cavings.

**15.54 Shale Density**  
Density of a representative shale sample taken from the cuttings, measured using a shale density kit

**15.55- 15.59 Spares 1-5**  
Spares may be used to customize the record. Since there is no formal definition of spare content the sender and receiver must agree in advance about such customization.

### Record #16: Hydrocarbon Show Record

**16.1- 16.7 See item descriptions in Record 1**

**16.8 Show Number**  
Sequential number assigned to consecutive show reports.

**16.9 Show Interval - Top Depth, Meas**  
Measured depth of the top of the interval.

**16.10 Show Interval - Top Depth, Vert**  
Vertical depth of the top of the interval.

**16.11 Show Interval - Bottom Depth, Meas**  
Measured depth of the bottom of the interval.

**16.12 Show Interval - Bottom Depth, Vert**  
Vertical depth of the bottom of the interval.

**16.13 Show Lith Type**  
Type of the show lithology.

**16.14 Show Lith Classification**  
Classification of the show lithology.

**16.15 Show Lith Color**  
Color of the show lithology.

**16.16 Show Lith Texture**  
Texture of the show lithology.

**16.17 Show Lith Hardness**  
Hardness or induration observed for the show lithology.

**16.18 Show Lith Grain Size**  
Average grain size observed in the show lithology.

**16.19 Show Lith Roundness**  
Degree of grain rounding observed in the show lithology.

**16.20 Show Lith Sorting**  
Degree of sorting observed in the show lithology.

**16.21 Show Lith Matrix/Cement**  
Type of matrix or cementing materials observed in the show lithology.

**16.22 Show Lith Accessories**  
Chief accessory associated with the show lithology.

**16.23 Show Lith Porosity - Visible**  
Observed (descriptive) porosity of the cuttings sample.

**16.24 Show Lith Porosity - Meas**  
Measured porosity of the cuttings sample.

**16.25 Show Lith Permeability**  
Measured permeability of the cuttings sample.

**16.26 Show Lith Stain Description**  
Amount, degree and color of staining observed in the sample, e.g. spotty, streaky, patchy, uniform, with relevant color and intensity.

**16.27 Show Lith Fluor Description**  
Type and amount of fluorescence observed in the sample.

**16.28 Show Lith Cut Description**  
Effects, under natural and Ultra-Violet light, of the addition of a solvent (e.g. Chlorothene), to the sample.

**16.29 Show Lith Cuttings Gas**  
Measured cuttings gas concentration during the show.

**16.30 Show Titrated Salinity**  
Measured salinity of the mud filtrate from a sample taken during the show.

**16.31 Show Mud Sample Methane**  
Amount of methane present in the gas extracted from the mud sample and injected into the chromatograph. Alternatively, where a steam still is not used, this is the value of methane measured from the gas stream at the peak of the show.

**16.32 Show Mud Sample Ethane**  
Amount of ethane present in the gas extracted from the mud sample and injected into the chromatograph. Alternatively, where a steam still is not used, this is the value of ethane measured from the gas stream at the peak of the show.

**16.33 Show Mud Sample Propane**  
Amount of propane present in the gas extracted from the mud sample and injected into the chromatograph. Alternatively, where a steam still is not used, this is the value of propane measured from the gas stream at the peak of the show.

**16.34 Show Mud Sample Iso-Butane**  
Amount of iso-butane present in the gas extracted from the mud sample and injected into the chromatograph. Alternatively, where a steam still is not used, this is the value of iso-butane measured from the gas stream at the peak of the show.

**16.35 Show Mud Sample Nor-Butane**  
Amount of nor-butane present in the gas extracted from the mud sample and injected into the chromatograph. Alternatively, where a steam still is not used, this is the value of nor-butane measured from the gas stream at the peak of the show.

**16.36 Show Mud Sample Iso-Pentane**  
Amount of iso-pentane present in the gas extracted from the mud sample and injected into the chromatograph. Alternatively, where a steam still is not used, this is the value of iso-pentane measured from the gas stream at the peak of the show.

**16.37 Show Mud Sample Nor-Pentane**  
Amount of nor-pentane present in the gas extracted from the mud sample and injected into the chromatograph. Alternatively, where a steam still is not used, this is the value of nor-pentane measured from the gas stream at the peak of the show.

**16.38 Show Mud Sample Neo-Pentane**  
Amount of neo-pentane present in the gas extracted from the mud sample and injected into the chromatograph. Alternatively, where a steam still is not used, this is the value of neo-pentane measured from the gas stream at the peak of the show.

**16.39 Show Mud Sample Iso-Hexane**  
Amount of iso-hexane present in the gas extracted from the mud sample and injected into the chromatograph. Alternatively, where a steam still is not used, this is the value of iso-hexane measured from the gas stream at the peak of the show.

**16.40 Show Mud Sample Nor-Hexane**  
Amount of nor-hexane present in the gas extracted from the mud sample and injected into the chromatograph. Alternatively, where a steam still is not used, this is the value of nor-hexane measured from the gas stream at the peak of the show.

**16.41 Show Comments**  
Comments pertaining to the hydrocarbon show

**16.42- 16.46 Spares 1-5**  
Spares may be used to customize the record. Since there is no formal definition of spare content the sender and receiver must agree in advance about such customization.

### Record #17: Cementing Record

Average, minimum and maximum values for items in this record are based on the current triggering interval for this record and are reset following the transmission of this record.

**17.1- 17.7 See item descriptions in Record 1**

**17.8 Depth Hole - Meas**  
Measured depth of the hole at the time the record is generated.

**17.9 Depth Hole - Vert**  
Vertical depth of the hole at the time the record is generated.

**17.10 Depth of Casing Shoe - Meas**  
Measured depth of the casing shoe being cemented.

**17.11 Depth of Casing Shoe - Vert**  
Vertical depth of the casing shoe being cemented.

**17.12 Pump Pressure**  
Measured pump pressure, averaged over the interval. This is the pressure required to displace fluid down the hole during the entire cementing operation (ie. rig pump pressure, cement truck pump pressure, etc.).

**17.13 Hookload - Avg**  
Measured hookload, averaged over the specified interval or connection.

**17.14 Block Position**  
Measured distance of the traveling block above the rotary table.

**17.15 Cem Flow Rate In - Calc**  
Flow rate of the fluid entering the hole, based on strokes per minute, averaged over the interval.

**17.16 Cem Flow Rate In - Meas**  
Flow rate of the fluid entering the hole, measured with a flow sensor, averaged over the interval.

**17.17 Cem Flow Rate Out - Meas**  
Flow rate of the fluid leaving the hole, measured with a flow sensor, averaged over the interval.

**17.18 Cem Flow Out - %**  
Percent of flow out as measured by a paddle or target sensor in the flow line, where 0% = no flow, 100% = full deflection of the sensor.

**17.19 Cem Fluid Density In - Avg**  
Measured density of the fluid entering the well, averaged over the interval.

**17.20 Cem Fluid Density Out - Avg**  
Measured density of the fluid leaving the well, averaged over the interval.

**17.21 ECD at Casing Shoe**  
Effective circulating density, at the casing shoe measured depth, of the fluids currently in the hole.

**17.22 Cem Fluid Temperature In - Avg**  
Measured temperature of the fluid entering the well, averaged over the interval.

**17.23 Cem Fluid Temperature Out - Avg**  
Measured temperature of the fluid leaving the well, averaged over the interval.

**17.24 Cem Stage Number**  
Current stage number of the cementing operation (i.e. 1 , 2, 3, etc.).

**17.25 Depth Of DV Tool**  
Measured depth of the DV tool at the time the record is generated.

**17.26 Cem Fluid Type/Batch**  
Type/batch of fluid currently being pumped. An integer number indicates the fluid type and a letter (ie. A,B,C etc.) indicates the batch. Type codes are:

        Drilling fluid (1)

        Spacer         (2)

        Cement         (3)

        DisplacemenT   (4)

The coding sequence for a cement job could look like this:

        1A, 2A, 2B, 3A, 3B, 4A, etc.

**17.27 Cem Cumulative Returns**  
Cumulative calculated/measured returns since the start of the cement job. This does not include mud circulation prior to pumping cement or spacer.

**17.28 Cem Individual Volume Pumped**  
Cumulative volume of fluid pumped, for the current individual type/batch, at the time the record is generated. This number should be reset to zero whenever the fluid type or batch changes.

**17.29 Cem Cement Volume Pumped**  
Cumulative volume of cement pumped (all batches in the current stage) at the time the record is generated.

**17.30 Cem Total Volume Pumped**  
Cumulative volume of spacer, cement and displacement fluid pumped (current stage) at the time the record is generated.

**17.31 Cem Volume to Bump Plug**  
Calculated volume required for the plug to bump.

**17.32 Cem No./Status of Plug(s)**  
Number/status of all plugs for the current stage. Number the plugs in sequential order starting with the first plug that will be released (i.e. bottom plug (1), middle plug (2), top plug (3)). The status is either loaded (L) or dropped (D) (ie. 1D2L3L).

**17.33 Cem Job Type**  
Type of cementing job being performed. Valid types are:

        Casing         (1)

        Liner          (2)

        Plug           (3)

        Squeeze        (4)

**17.34- 17.38 Spares 1-5**  
Spares may be used to customize the record. Since there is no formal definition of spare content the sender and receiver must agree in advance about such customization.

### Record #18: Drill Stem Testing Record

Average, minimum and maximum values for items in this record are based on the current triggering interval for this record and are reset following the transmission of this record.

**18.1- 18.7 See item descriptions in Record 1**

**18.8 DST Identification**  
Identifier assigned to current DST.

**18.9 DST Interval Top Depth - Meas**  
Measured depth of top perforations, or depth of top packer in an open hole DST.

**18.10 DST Interval Top Depth - Vert**  
Vertical depth of top perforations, or depth of top packer in an open hole DST.

**18.11 DST Interval Bottom Depth - Meas**  
Measured depth of bottom perforations, or depth of bottom packer in an open hole DST.

**18.12 DST Interval Bottom Depth - Vert**  
Vertical depth of bottom perforations, or depth of bottom packer in an open hole DST.

**18.13 DST Tool Time**  
Time elapsed since the tool began running.

**18.14 DST State of Well**  
Current state of the well : 1=flowing, 0= shut in

**18.15 DST Surface Pressure - Tubing**  
Pressure recorded inside the tubing at the surface.

**18.16 DST Surface Pressure - Casing**  
Pressure recorded inside the casing at the surface.

**18.17 DST Surface Temperature - Tubing**  
Temperature recorded inside the tubing at the surface.

**18.18 DST Bottom Hole Pressure**  
Pressure recorded at the bottom of the hole.

**18.19 DST Bottom Hole Temperature**  
Temperature recorded at the bottom of the hole.

**18.20 DST Liquid Flow Rate**  
Measured liquid flow rate at the time the record is generated.

**18.21 DST Gas Flow Rate**  
Measured gas flow rate at the time the record is generated.

**18.22 DST Total Flow Rate**  
Measured total flow rate at the time the record is generated.

**18.23 DST Cum Liquid Production**  
Total liquid production up to the time the record is generated.

**18.24 DST Cum Gas Production**  
Total gas production up to the time the record is generated.

**18.25 DST Cum Total Production**  
Total production up to the time the record is generated.

**18.26 Hydrogen Sulfide**  
Measured concentration of hydrogen sulfide at the time the record is generated.

**18.27- 18.31 Spares 1-5**  
Spares may be used to customize the record. Since there is no formal definition of spare content the sender and receiver must agree in advance about such customization.

### Record #19: Configuration Record

**19.1- 19.7 See item descriptions in Record 1**

**19.8 Depth Hole - Meas**  
Measured depth of the hole at the time the record is generated.

**19.9 Depth Hole - Vert**  
Vertical depth of the hole at the time the record is generated.

**19.10 No. Drill String Sections**  
Number of different sections in the drill string (1-6), starting at the first section above the bit. The limitation of six sections means that parts of the BHA may have to be treated as a combined unit.

NOTE: If there is only one section, DS Section 1 Length becomes -9999.0, and the remaining DS elements (2-6) contain -9999.0. If there are two drillstring sections, DS Section 2 Length becomes -9999.0 and the remaining DS elements (3-6) contain -9999.0, etc. The null value indicates that the section length will be increasing during drilling (with the addition of new joints of pipe) and should be calculated by subtracting actual section lengths from total depth.

**19.11 DS Section 1 OD**  
Outside diameter of the pipe constituting drillstring section 1.

**19.12 DS Section 1 ID**  
Inside diameter of the pipe constituting drillstring section 1.

**19.13 DS Section 1 Tool Joint ID**  
Inside diameter of the tool joint of drillstring section 1.

**19.14 DS Section 1 Tool Joint OD**  
Outside diameter of the tool joint of drillstring section 1.

**19.15 DS Section 1 Mass/Length**  
Mass per unit length of drillstring section 1.

**19.16 DS Section 1 Length**  
Length of drillstring section 1.

**19.17 DS Section 2 OD**  
Outside diameter of the pipe constituting drillstring section 2.

**19.18 DS Section 2 ID**  
Inside diameter of the pipe constituting drillstring section 2.

**19.19 DS Section 2 Tool Joint ID**  
Inside diameter of the tool joint of drillstring section 2.

**19.20 DS Section 2 Tool Joint OD**  
Outside diameter of the tool joint of drillstring section 2.

**19.21 DS Section 2 Mass/Length**  
Mass per unit length of drillstring section 2.

**19.22 DS Section 2 Length**  
Length of drillstring section 2.

**19.23 DS Section 3 OD**  
Outside diameter of the pipe constituting drillstring section 3.

**19.24 DS Section 3 ID**  
Inside diameter of the pipe constituting drillstring section 3.

**19.25 DS Section 3 Tool Joint ID**  
Inside diameter of the tool joint of drillstring section 3.

**19.26 DS Section 3 Tool Joint OD**  
Outside diameter of the tool joint of drillstring section 3.

**19.27 DS Section 3 Mass/Length**  
Mass per unit length of drillstring section 3.

**19.28 DS Section 3 Length**  
Length of drillstring section 3.

**19.29 DS Section 4 OD**  
Outside diameter of the pipe constituting drillstring section 4.

**19.30 DS Section 4 ID**  
Inside diameter of the pipe constituting drillstring section 4.

**19.31 DS Section 4 Tool Joint ID**  
Inside diameter of the tool joint of drillstring section 4.

**19.32 DS Section 4 Tool Joint OD**  
Outside diameter of the tool joint of drillstring section 4.

**19.33 DS Section 4 Mass/Length**  
Mass per unit length of drillstring section 4.

**19.34 DS Section 4 Length**  
Length of drillstring section 4.

**19.35 DS Section 5 OD**  
Outside diameter of the pipe constituting drillstring section 5.

**19.36 DS Section 5 ID**  
Inside diameter of the pipe constituting drillstring section 5.

**19.37 DS Section 5 Tool Joint ID**  
Inside diameter of the tool joint of drillstring section 5.

**19.38 DS Section 5 Tool Joint OD**  
Outside diameter of the tool joint of drillstring section 5.

**19.39 DS Section 5 Mass/Length**  
Mass per unit length of drillstring section 5.

**19.40 DS Section 5 Length**  
Length of drillstring section 5.

**19.41 DS Section 6 OD**  
Outside diameter of the pipe constituting drillstring section 6.

**19.42 DS Section 6 ID**  
Inside diameter of the pipe constituting drillstring section 6.

**19.43 DS Section 6 Tool Joint ID**  
Inside diameter of the tool joint of drillstring section 6.

**19.44 DS Section 6 Tool Joint OD**  
Outside diameter of the tool joint of drillstring section 6.

**19.45 DS Section 6 Mass/Length**  
Mass per unit length of drillstring section 6.

**19.46 Kelly ID**  
Internal diameter of the kelly.

**19.47 Kelly Length**  
Length of the kelly

**19.48 Drill Pipe Stand Length**  
Average length of a stand of drill pipe.

**19.49 No. Joints/Stand**  
Number of tool joints per stand of drill pipe (typically 2 or 3).

**19.50 No. Hole Sections**  
Number of different hole size sections in the well (1-5), starting from below the flowline. The first section is usually the conductor or riser.

NOTE: If there is only one section, Hole Section 1 Length becomes -9999.0, and the remaining Hole Section elements (2-5) contain -9999.0. If there are two hole sections, Hole Section 2 Length becomes -9999.0 and the remaining Hole Section elements (3-5) contain -9999.0, etc. The null value indicates that the section length will be increasing during drilling (with the drilling of new hole) and should be calculated by subtracting actual section lengths from total depth.

**19.51 Hole Section 1 Diameter**  
Internal diameter of the first hole section (from the top), usually the internal diameter of the riser (floating rig) or the last string of casing.

**19.52 Hole Section 1 Length**  
Length of the first hole section.

**19.53 Hole Section 2 Diam**  
Internal diameter of the second hole section.

**19.54 Hole Section 2 Length**  
Length of the second hole section.

**19.55 Hole Section 3 Diam**  
Internal diameter of the third hole section.

**19.56 Hole Section 3 Length**  
Length of the third hole section.

**19.57 Hole Section 4 Diam**  
Internal diameter of the fourth hole section.

**19.58 Hole Section 4 Length**  
Length of the fourth hole section.

**19.59 Hole Section 5 Diam**  
Internal diameter of the fifth hole section.

**19.60 Pump 1 Capacity**  
Rated output of Pump 1 at 100% efficiency

**19.61 Pump 1 Efficiency**  
Measured operating efficiency of Pump 1.

**19.62 Pump 2 Capacity**  
Rated output of Pump 2 at 100% efficiency

**19.63 Pump 2 Efficiency**  
Measured operating efficiency of Pump 2.

**19.64 Pump 3 Capacity**  
Rated output of Pump 3 at 100% efficiency

**19.65 Pump 3 Efficiency**  
Measured operating efficiency of Pump 3.

**19.66 Rig Operating Cost/Hour**  
Hourly operating cost of the drilling operation, as specified by the operator.

**19.67 Trip Rate (Dist/Time)**  
Estimated average rate of tripping pipe.

**19.68 Kill Line ID**  
Internal diameter of the kill line.

**19.69 Kill Line Joint ID**  
Internal diameter of the joints in the kill line.

**19.70 Kill Line Joint Fraction**  
Proportion of the total kill line which is made up of joints, expressed as a percentage.

**19.71 Kill Line Length**  
Total length of the kill line.

**19.72 Choke Line ID**  
Internal diameter of the choke line.

**19.73 Choke Line Joint ID**  
Internal diameter of the joints in the choke line.

**19.74 Choke Line Joint Fraction**  
Proportion of the total choke line which is made up of joints, expressed as a percentage.

**19.75 Choke Line Length**  
Total length of the choke line.

**19.76 Depth Casing Shoe - Meas**  
Measured depth of the last casing shoe.

**19.77 Depth Casing Shoe - Vert**  
Vertical depth of the last casing shoe.

**19.78 Depth PIT - Meas**  
Measured depth at which the last Pressure Integrity Test on formation was performed.

**19.79 Depth PIT - Vert**  
Vertical depth at which the last Pressure Integrity Test on formation was performed.

**19.80 Fracture Pressure Gradient at PIT**  
Total pressure (hydrostatic + pump) required to inject fluid into the formation, expressed in equivalent mud density for the last Pressure Integrity Test on formation.

**19.81 Drilling Contractor**  
Name of the drilling contractor.

**19.82 Rig Name**  
Name of the drilling rig, including number where appropriate.

**19.83 Rig Type**  
Type of rig installation. (e.g. LAND / BARGE / SUBMERSIBLE / PLATFORM / JACKUP / DRILLSHIP / SEMISUB / ARTIFICIAL ISL., etc.)

**19.84- 19.89 Vendor 1-6 Name/Service**  
Names of up to six service companies used on the well, reported in the form "company name/service rendered", e.g. Smith Co./Wireline

**19.90- 19.94 Spares 1-5**  
Spares may be used to customize the record. Since there is no formal definition of spare content the sender and receiver must agree in advance about such customization.

### Record #20: Mud Report Record

**20.1- 20.7 See item descriptions in Record 1.**

**20.8 Mud Report Depth - Meas**  
Measured hole depth at the time that the mud sample was taken.

**20.9 Mud Report Depth - Vert**  
Vertical hole depth at the time that the mud sample was taken.

**20.10 Mud Report Number**  
Sequential count corresponding to actual mud reports filled out at the rig. This number may or may not correspond to the sequence identifier.

**20.11 Mud Report Mud Type**  
Type of mud system in use at the time of the report. e.g. lignosulfonate, KCl, etc.

**20.12 Mud Report Sample Location**  
Source of the mud sample. e.g. flowline, suction, etc.

**20.13 Mud Report Sample Date**  
Date of the report, in form YYMMDD. Dates and times are in Universal Coordinated Time (Greenwich Mean Time).

**20.14 Mud Report Sample Time**  
Time of the report, in form HHMMSS. Dates and times are in Universal Coordinated Time (Greenwich Mean Time).

**20.15 Mud Report Mud Density**  
Density of the mud sample.

**20.16 Mud Report Funnel Viscosity**  
Viscosity of the mud in terms of the time taken for a given volume to pass through a funnel.

**20.17 Mud Report Funnel Viscosity Temperature**  
Temperature of the mud sample at the time of the measurement of funnel viscosity.

**20.18 Mud Report Plastic Viscosity**  
Plastic viscosity of the mud, derived from viscometer readings.

**20.19 Mud Report Yield Point**  
Yield point of the mud, derived from viscometer readings.

**20.20 Mud Report Gel - 10 sec**  
Gel strength of the mud 10 seconds after stirring.

**20.21 Mud Report Gel - 10 min**  
Gel strength of the mud 10 minutes after stirring.

**20.22 Mud Report Gel - 30 min**  
Gel strength of the mud 30 minutes after stirring.

**20.23 Mud Report Filtrate**  
API filtrate (fluid loss) using a filter press at 100 psi pressure and surface temperature.

**20.24 Mud Report Filter Cake**  
Thickness of the residual solid film deposited on the filter paper by the loss of fluid from the filter press.

**20.25 Mud Report HTHP Temperature**  
Operating temperature of the high temperature-high pressure filter press. API specification is 300 deg F.

**20.26 Mud Report HTHP Pressure**  
Operating pressure of the high temperature-high pressure filter press. API specification is 500 psi.

**20.27 Mud Report HTHP Filtrate**  
API HTHP fluid loss from the high temperature-high pressure filter press.

**20.28 Mud Report HTHP Filter Cake**  
Thickness of residual solid film deposited on the filter paper by the loss of fluid from the HTHP filter press.

**20.29 Mud Report Solids % - Retort**  
Proportion of suspended and dissolved solids measured after passing the mud sample through a retort (mud still).

**20.30 Mud Report Water % - Retort**  
Proportion of water measured after passing the mud sample through a retort.

**20.31 Mud Report Oil % - Retort**  
Proportion of oil measured after passing the mud sample through a retort.

**20.32 Mud Report Sand %**  
Proportion of sand-size particles in the mud sample, measured with a sand screen set.

**20.33 Mud Report Low Gravity Solids %**  
Proportion of low gravity solids in the sample.

**20.34 Mud Report Solids % Calc**  
Calculated solids content of the sample.

**20.35 Mud Report Barite Content**  
Amount of barite present in the sample.

**20.36 Mud Report LCM Content**  
Estimated amount of lost circulation material present in the sample.

**20.37 Mud Report MBT Capacity**  
Cation exchange capacity (CEC) of the mud sample as measured by methylene blue titration.

**20.38 Mud Report pH**  
Measured hydrogen ion concentration in the sample.

**20.39 Mud Report pH Sample Temp**  
Temperature of the mud sample at the time of pH measurement.

**20.40 Mud Report Pm**  
Phenolphthalein alkalinity of the mud, measured by titration with a standardized acid solution.

**20.41 Mud Report Pf**  
Phenolphthalein alkalinity of the filtrate, measured by titration with a standardized acid solution.

**20.42 Mud Report Mf**  
Bromocresol green-methyl orange alkalinity of the filtrate measured by titration following the Pf reading.

**20.43 Mud Report P1**  
Phenolphthalein alkalinity of the filtrate to which sodium hydroxide and barium chloride have been added.

**20.44 Mud Report P2**  
Phenolphthalein alkalinity of the water and reagents used to determine P1, the filtrate being omitted.

**20.45 Mud Report Chloride Content**  
Measured chloride ion concentration (salinity) in the mud filtrate.

**20.46 Mud Report Calcium Content**  
Measured calcium ion concentration in the mud filtrate.

**20.47 Mud Report Magnesium Content**  
Measured magnesium ion concentration in the mud filtrate.

**20.48 Mud Report Potassium Content**  
Measured potassium ion concentration in the mud filtrate, measured by the STPB, sodium perchlorate or potassium select electrode method.

**20.49 Mud Report Rheometer Temperature**  
Temperature of the mud when the viscometer readings were made.

**20.50 Mud Report Viscometer 3 RPM**  
Observed viscometer dial deflection at 3 rpm.

**20.51 Mud Report Viscometer 6 RPM**  
Observed viscometer dial deflection at 6 rpm.

**20.52 Mud Report Viscometer 100 RPM**  
Observed viscometer dial deflection at 100 rpm.

**20.53 Mud Report Viscometer 200 RPM**  
Observed viscometer dial deflection at 200 rpm.

**20.54 Mud Report Viscometer 300 RPM**  
Observed viscometer dial deflection at 300 rpm.

**20.55 Mud Report Viscometer 600 RPM**  
Observed viscometer dial deflection at 600 rpm.

**20.56 Mud Report Brine %**  
Proportion of the liquid fraction of an oil based mud which is composed of brine, calculated from the corrected oil/water ratio.

**20.57 Mud Report Alkalinity**  
Phenolphthalein alkalinity (Pm) of an oil based mud, measured by titration with sulphuric acid.

**20.58 Mud Report Lime Content**  
Calculated lime content of the oil based mud sample.

**20.59 Mud Report Electrical Stability**  
Measured electrical stability of the sample, used to estimate emulsion strength of the oil based mud.

**20.60 Mud Report CaCl - Wt %**  
Percent by weight of calcium chloride in the water phase of an oil based mud.

**20.61- 20.65 Spares 1-5**  
Spares may be used to customize the record. Since there is no formal definition of spare content the sender and receiver must agree in advance about such customization.

### Record #21: Bit Report Record

**21.1- 21.7 See item descriptions in Record 1.**

**21.8 Bit Number**  
Bit number, as specified by the operator.

**21.9 Bit Diameter**  
Outside diameter of the bit.

**21.10 Bit Manufacturer**  
Name of the manufacturer of the bit.

**21.11 Bit Name**  
Name for the bit as designated by the manufacturer.

**21.12 Bit IADC Code**  
International Association of Drilling Contractors (IADC) identifying code for the bit type.

**21.13 Bit Serial Number**  
Serial number for the bit assigned by the manufacturer.

**21.14 Bit Cost**  
Cost of the bit, as specified by the operator.

**21.15 Bit Jet 1 Diameter**  
Diameter of jet (nozzle) 1. If bit has more than 5 jets, enter null here and enter Total Flow Area in 21.20.

**21.16 Bit Jet 2 Diameter**  
Diameter of jet (nozzle) 2. If bit has more than 5 jets, enter null here and enter Total Flow Area in 21.20.

**21.17 Bit Jet 3 Diameter**  
Diameter of jet (nozzle) 3. If bit has more than 5 jets, enter null here and enter Total Flow Area in 21.20.

**21.18 Bit Jet 4 Diameter**  
Diameter of jet (nozzle) 4. If bit has more than 5 jets, enter null here and enter Total Flow Area in 21.20.

**21.19 Bit Center Jet Diameter**  
Diameter of the center jet (nozzle). If bit has more than 5 jets, enter null here and enter Total Flow Area in 21.20.

**21.20 Bit Total Flow Area**  
Total Flow Area for fluid calculated for a given bit. This variable is entered for any bit which has a throat rather than jets or has more than five jets. Otherwise, it should be null. Do not enter jet sizes when reporting TFA.

**21.21 Bit Starting Depth (Depth In)**  
Measured depth at the start of the bit run.

**21.22 Bit Ending Depth (Depth Out)**  
Measured depth at the end of the bit run (null if bit run not over).

**21.23 Bit Run Drilled Distance**  
Total distance drilled in a given bit run. For a re-run bit, this pertains only to this run and does not include the distance drilled during previous runs of the same bit.

**21.24 Bit Run Drilled Time**  
Total number of hours in a given bit run. This does not include wash and ream, connection time, survey time or reaming time (null if bit run not over).

**21.25 Bit Reamed Time**  
Total number of hours spent reaming during this bit run (null if bit run not over).

**21.26 Bit Run Penetration Rate Avg**  
Drill rate averaged over this bit run. In the case of a re-run bit, calculate ROP based on this run only (null if bit run not over). Calculated from 21.23/21.24.

**21.27 Bit Run Weight On Bit Avg**  
Average weight on bit over the bit run (null if bit run not over).

**21.28 Bit Run Weight On Bit Max**  
Maximum weight on bit over the bit run (null if bit run not over).

**21.29 Bit Run Rotary Speed Avg**  
Average rotary speed over the bit run (null if bit run not over).

**21.30 Bit Run Rotary Speed Max**  
Maximum rotary speed over the bit run (null if bit run not over).

**21.31 Bit Run Mud Flow Rate Avg**  
Average mud flow rate over the bit run (null if bit run not over).

**21.32 Bit Run Mud Density Avg**  
Average mud density in over the bit run (null if bit run not over).

**21.33 Bit Run Stand Pipe Pressure Avg**  
Average stand pipe (pump) pressure over the bit run (null if bit run not over).

**21.34 Bit Reason Run**  
Primary reason for running the bit.

**21.35 Bit Reason Pulled**  
Primary reason for pulling the bit (blank if bit run not over).

**21.36 Bit Grade In**  
IADC dull grade condition of the bit as it went into the hole.

**21.37 Bit Grade Out**  
IADC dull grade condition of the bit as it came out of the hole (blank if bit run not over).

**21.38 Bit Shock Sub Used ?**  
Indicate whether a shock sub was used with the bit (Y or N).

**21.39 Bit Mud Motor Used ?**  
Indicate whether a mud motor was used with the bit (Y or N).

**21.40 Bit Comments**  
Any comments concerning bit grade or unusual operating conditions.

**21.41- 21.49 Spares 1-9**  
Spares may be used to customize the record. Since there is no formal definition of spare content the sender and receiver must agree in advance about such customization.

### Record #22: Remarks Record

**22.1- 22.7 See item descriptions in Record 1.**

**22.8 Depth Hole - Meas**  
Measured depth of the hole at the time the record is generated.

**22.9 Depth Hole - Vert**  
Vertical depth of the hole at the time the record is generated.

**22.10 Comments**  
General comments concerning the drilling environment. Include any comments which may help clarify data received in the other records, such as unusual activities or equipment failures.

### Record #23: Well Identification Record

**23.1- 23.7 See item descriptions in Record 1.**

**23.8 Well Name**  
Wellname assigned by the Operator.

**23.9 Well Identification Number**  
Well number assigned by the Operator.

**23.10 Operator**  
Name of the company designated as Operator.

**23.11 Well Classification - Lahee**  
Classification for the type of well being drilled, based on Lahee :

        NEW FIELD W'CAT        (1)

        NEW POOL  W'CAT        (2)

        DEEPER TEST            (3)

        SHALLOWER TEST         (4)

        EXTENSION TEST         (5)

        DEVELOPMENT WELL       (6)

**23.12 Well Location**  
Name of the jurisdictional area, county, state or offshore area (+ block number) where the well is being drilled.

**23.13 Well UTM Position**  
Universal Transverse Mercator location of the wellbore relative to the standard reference point.

**23.14 Well Surface Latitude**  
Latitude of the wellbore surface location.

**23.15 Well Surface Longitude**  
Longitude of the wellbore surface location.

**23.16 Field Name**  
Name of the field in which the well is being drilled. Enter prospect names for wildcats.

**23.17 Elevation: Datum Point-MSL**  
Elevation of the designated datum point for the well above mean sea level.

**23.18 Elevation: Kelly Bushing-MSL**  
Elevation of the rotary kelly bushing above mean sea level.

**23.19 Elevation: Ground Level-MSL**  
Elevation of the ground level above mean sea level (null if offshore).

**23.20 Water Depth**  
Distance from the seabed to mean sea level (null if onshore). If dredging has occurred, enter the pre-dredge seabed depth.

**23.21 Spud Date**  
Date on which the drilling commenced. Specified by the Operator. In the form YYMMDD.

**23.22- 23.31 Custom Field Identifiers (01-10)**  
Custom field identifiers indicate the use of Spare fields in other records. This permits at- a-glance identification of customized records and variables. Identification information should be reported in the form:

        RRIIMMMMMMMMUUUUDDDDDDDDDDDDDDDD

        RR                     = record number in which the spare field is used

        II                     = item number of spare field in that record

        MMMMMMMM               = long mnemonic for variable (or MMMM and four spaces

                                      for short mnemonic)

        UUUU                   = units mnemonic for variable

        DDDDDDDDDDDDDDDD       = variable description

**23.32 Units type used**  
Indicates the type of units used. Acceptable standard types are "FPS" and "METRIC". Non-standard types must be agreed upon between the operator and the vendor. Only the standard types are used at WITS levels 0, 1 and 2.

**23.33 Time Zone Offset**  
Time difference of the rig location from Universal Coordinated Time (Greenwich Mean Time). This is expressed in the form (-)HHMMSS such that a six hour difference west of UCT would be -60000, while a three hour difference east of UCT would be 30000. In locations where daylight savings time (summer time) is used, it is necessary to update this field and transmit the record following the resetting of clocks at the wellsite (if applicable).

**23.34- 23.37 Spares 1-4**  
Spares may be used to customize the record. Since there is no formal definition of spare content the sender and receiver must agree in advance about such customization.

### Record #24: Vessel Motion/Mooring Status Record

Average, minimum and maximum values for items in this record are based on the current triggering interval for this record and are reset following the transmission of this record.

**24.1- 24.7 See item descriptions in Record 1.**

**24.8 Water Depth - Mean**  
Mean distance between sea level and the sea bed.

**24.9 Tide**  
Variance (+/-) in mean water depth.

**24.10 Vessel Heading**  
Heading of the vessel, relative to true north, at the time the record is generated.

**24.11 Rig VCG**  
Most recently calculated vertical center of gravity of rig, measured from the bottom of the keel.

**24.12 Riser Tension**  
Tension on the riser at the time the record is generated.

**24.13 Rig Offset - Avg**  
Average horizontal displacement of the rig from the wellbore since the last record was generated.

**24.14 Rig Offset - Max**  
Maximum horizontal displacement of the rig from the wellbore since the last record was generated.

**24.15 Rig Offset Direction**  
Direction, relative to true north, the rig is displaced from the wellbore.

**24.16 LMRP Angle - Avg**  
Average angle of the Lower Marine Riser Package from vertical, since the last record was generated.

**24.17 LMRP Angle - Max**  
Maximum angle of the Lower Marine Riser Package from vertical, since the last record was generated.

**24.18 LMRP Direction**  
Direction, relative to true north, the LMRP is displaced from vertical.

**24.19 Fluid Density in Riser**  
Density of the fluid in the riser at the time the record is generated.

**24.20- (even numbers)  
24.42 Mooring Line Tension - Avg**  
Average tension in each of the designated mooring lines since the last record was generated.

**24.21- (odd numbers)  
24.43 Mooring Line Tension - Max**  
Maximum tension in each of the designated mooring lines since the last record was generated.

**24.44- (even numbers)  
24.58 Thruster Force**  
Force being generated by each of the designated thrusters at the time the record is generated.

**24.45- (odd numbers)  
24.59 Thruster Direction**  
Direction, relative to true north, of each of the designated thrusters at the time the record is generated.

**24.60- 24.64 Spares 1-5**  
Spares may be used to customize the record. Since there is no formal definition of spare content the sender and receiver must agree in advance about such customization.

### Record #25: Weather/Sea State Record

Average, minimum and maximum values for items in this record are based on the current triggering interval for this record and are reset following the transmission of this record.

**25.1- 25.7 See item descriptions in Record 1.**

**25.8 Water Depth - Mean**  
Mean distance between sea level and the sea bed.

**25.9 Air Temperature**  
Temperature of the air at the time the record is generated.

**25.10 Barometric Pressure**  
Barometric pressure at the time the record is generated.

**25.11 Waves - Significant Height**  
Average of the highest one third observations of local waves measured over the interval.

**25.12 Waves - Maximum Height**  
Average of the highest one tenth observations of local waves measured over the interval.

**25.13 Waves - Mean Period**  
Average elapsed time between occurrences of successive zero-up crossings of local waves.

**25.14 Waves - Direction**  
Direction, relative to true north, from which the waves are coming at the time the record is generated.

**25.15 Swell - Significant Height**  
Average of the highest one third observations of the swell measured over the interval.

**25.16 Swell - Maximum Height**  
Average of the highest one tenth observations of the swell measured over the interval.

**25.17 Swell - Mean Period**  
Average elapsed time between occurrences of successive zero-up crossings of the swell.

**25.18 Swell - Direction**  
Direction, relative to true north, from which the swell is coming at the time the record is generated.

**25.19 Wind Speed - 1 min.**  
Maximum one minute wind speed measured over the interval.

**25.20 Wind Gusts - 5 sec.**  
Maximum 5 second wind speed measured over the interval.

**25.21 Wind Direction**  
Direction, relative to true north, from which the wind is coming at the time the record is generated.

**25.22 Anemometer Height**  
Distance of the anemometer above mean sea level.

**25.23 Current Speed**  
Average speed of the current measured over the interval.

**25.24 Current Direction**  
Direction, relative to true north, from which the current is coming at the time the record is generated.

**25.25 Depth Current Measured**  
Depth at which the current is measured, below mean sea level.

**25.26 Vessel - Mean Draft**  
Mean draft of the vessel at the time the record is generated.

**25.27 Heave - Peak to Peak - Significant**  
Average of the highest one third observations of heave of the vessel measured over the interval.

**25.28 Heave - Peak to Peak - Max**  
Average of the highest one tenth observations of the heave of the vessel measured over the interval.

**25.29 Heave - Mean Period**  
Average time elapsing between successive occurrences of heave, measured over the interval.

**25.30 Roll - Peak to Peak - Significant**  
Average of the highest one third observations of roll of the vessel measured over the interval.

**25.31 Roll - Peak to Peak - Max**  
Average of the highest one tenth observations of the roll of the vessel measured over the interval.

**25.32 Roll - Mean Period**  
Average time elapsing between successive occurrences of roll, measured over the interval.

**25.33 Pitch - Peak to Peak - Significant**  
Average of the highest one third observations of pitch of the vessel measured over the interval.

**25.34 Pitch - Peak to Peak - Max**  
Average of the highest one tenth observations of the pitch of the vessel measured over the interval.

**25.35 Pitch - Mean Period**  
Average time elapsing between successive occurrences of pitch, measured over the interval.

**25.36 Yaw - Peak to Peak - Significant**  
Average of the highest one third observations of yaw of the vessel measured over the interval.

**25.37 Yaw - Peak to Peak - Max**  
Average of the highest one tenth observations of the yaw of the vessel measured over the interval.

**25.38 Yaw - Mean Period**  
Average time elapsing between successive occurrences of yaw, measured over the interval.

**25.39 Surge - Peak to Peak - Significant**  
Average of the highest one third observations of surge of the vessel measured over the interval.

**25.40 Surge - Peak to Peak - Max**  
Average of the highest one tenth observations of the surge of the vessel measured over the interval.

**25.41 Surge - Mean Period**  
Average time elapsing between successive occurrences of surge, measured over the interval.

**25.42 Sway - Peak to Peak - Significant**  
Average of the highest one third observations of sway of the vessel measured over the interval.

**25.43 Sway - Peak to Peak - Max**  
Average of the highest one tenth observations of the sway of the vessel measured over the interval.

**25.44 Sway - Mean Period**  
Average time elapsing between successive occurrences of sway, measured over the interval.

**25.45 Trim**  
Mean trim angle of the vessel at the time the record is generated; bow down is positive, stern down is negative.

**25.46 Heel**  
Mean heel angle of the vessel at the time the record is generated; starboard side down is positive, port side down is negative.

**25.47 Weather / Sea State Comments**  
Any comments of relevance to this record, such as weather forecasts, hurricane tracking, etc.

**25.48- 25.52 Spares 1-5**  
Spares may be used to customize the record. Since there is no formal definition of spare content the sender and receiver must agree in advance about such customization.