DDR Plus™

IADC Schema V2.0
Description & Guide

October 2019

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1. Introduction

This document describes how IADC DDR Plus™ "tour sheet" data will be expressed in an XML document, based on the WITSML 1.4.1.1 schema format.

1.1 Versioning

This schema is yet to be integrated into the current WITSML 1.4.1.1 schema (pending discussion/approval with Energistics), so is built separately, with its own versioning which is hereby named **IADC Schema v1.0.0.0**. Though built separately, it is based on the WITSML 1.4.1.1 schema format, for easy implementation/integration in the near future.

The version numbering for the IADC Schema is described here:

major.minor[.maintenance[.revision]]

Section 4 in this document, describes the mapping of the IADC fields to the XML output.

2. Frequently Asked Questions

Before we start, let's answer some frequently asked questions about the new DDR Plus™ and its associated schema:

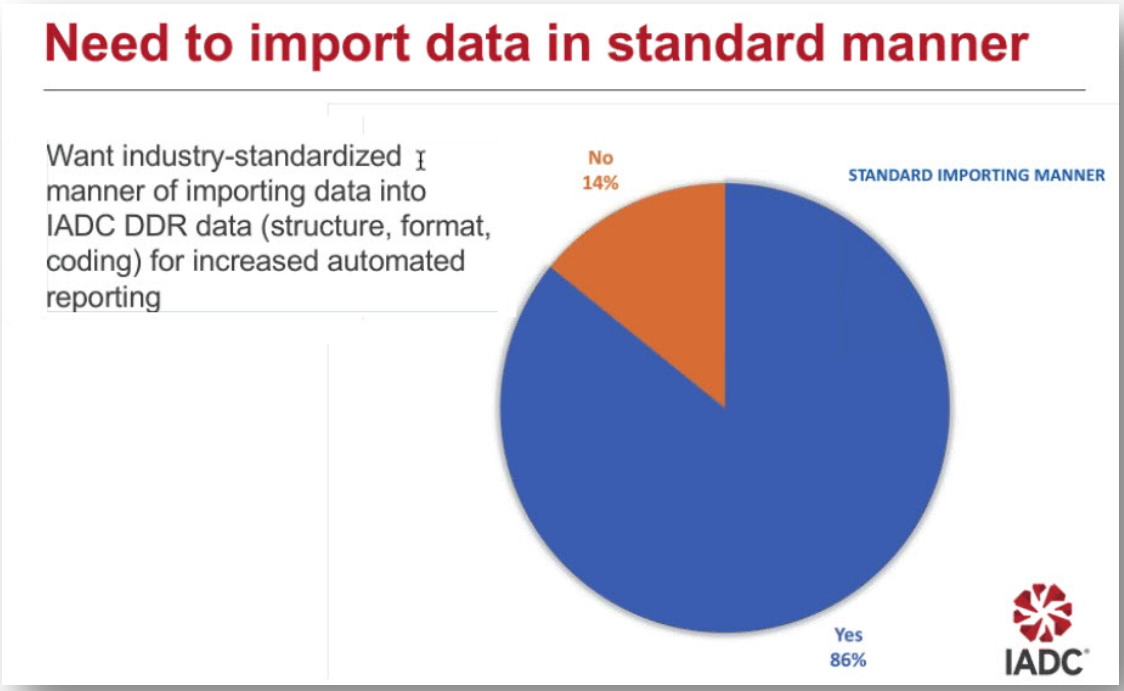
2.1 Why has the Daily Drilling Report (DDR) "Tour Sheet" changed?

The drilling industry has undergone numerous developments in technology, sensor capability, and computer power, with an eye toward increased automation. The IADC DDR Plus™ is a print and electronic data collection system aimed at securing accurate and relevant drilling data that industry can use to assess performance against drilling Key Performance Indicators.

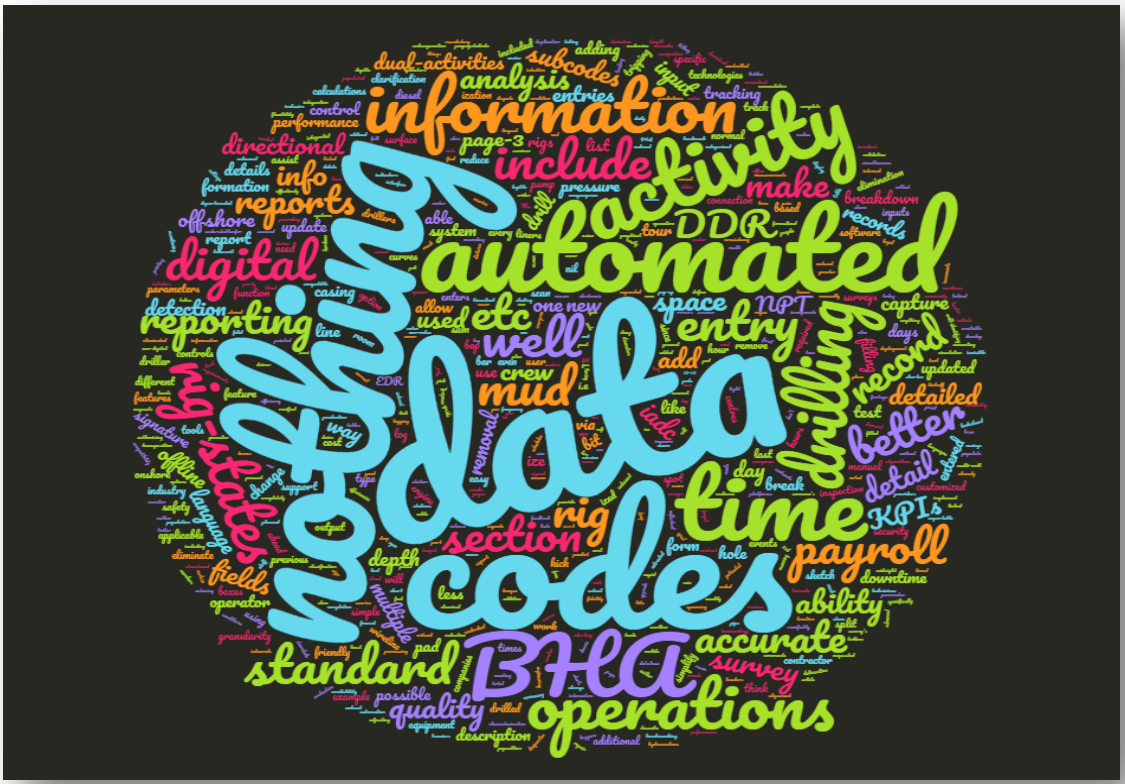
Largely unchanged for decades, IADC Members realized the report was losing relevance and utility in the 21st century digital world.

IADC Members were surveyed in early 2018 with a questionnaire to find out how they wanted the DDR improving. A total of 134 responses were received - 78 responses from 29 different drilling contractors, 21 from 17 different operators, 16 from 12 different service companies, and 3 from 3 different data management companies.

Here are some of the results from the survey:



When asked more generally "What… you would like changed on or about the IADC DDR to make it more useful for you and/or your company?", here is a snapshot of the answers:



2.2 How was the DDR updated?

Using the results of the Member survey, the IADC Advanced Rig Technology, Drilling Controls Systems subcommittee focused on the main areas of interest: digitizing the report and updating the Operation codes and other pick lists.

2.3 What is the DDR Plus™?

The result of the above work, the DDR Plus™ replaces the existing IADC Daily Drilling Report (DDR) and is being phased in during 2019. IADC Members will be expected to be using the DDR Plus™ by 2020.

2.4 What has changed?

Only a handful of updates have been made to the basic code structure:

1 - Six new Operation codes have been added: 33, “Operating Status;” 34, “Safety;” 35, “Well Control;” 36, “Coiled Tubing;” and 38, “Subsea Installations.”; and all Completion codes are grouped into one: 37, “Completion Activities”. A side-by-side comparison of legacy and DDR Plus™ main codes follows.

Old DDR		DDR Plus™	
CODE	OPERATION	CODE	OPERATION
1	RIG UP AND TEAR DOWN	1	RIG UP / TEAR DOWN / MOVE
2	DRILL ACTUAL	2	DRILLING
3	REAMING	3	REAMING
4	CORING	4	CORING
5	CONDITION MUD &	5	CIRCULATE & CONDITION
6	TRIPS	6	TRIPS
7	LUBRICATE RIG	7	SERVICE/MAINTAIN RIG
8	REPAIR RIG	8	REPAIR RIG
9	CUT OFF DRILLING LINE	9	REPLACING DRILL LINE
10	DEVIATION SURVEY	10	DEVIATION SURVEY
11	WIRE LINE LOGS	11	WIRELINE LOGS
12	RUN CASING & CEMENT	12	RUN CASING & CEMENT
13	WAIT ON CEMENT	13	WAIT ON CEMENT
14	NIPPLE UP B.O.P.	14	RIG UP/DOWN BOP
15	TEST B.O.P.	15	TEST BOP
16	DRILL STEM TEST	16	DRILL STEM TEST
17	PLUG BACK	17	PLUG BACK
18	SQUEEZE CEMENT	18	SQUEEZE CEMENT
19	FISHING	19	FISHING
20	DIR. WORK	20	SPECIALIZED DIRECTIONAL
21	RUN/RETRIEVE RISER EQUIP.	21	OTHER
22	SURFACE TESTING	22	OTHER
23	OTHER	23	OTHER
	[unused]	31	RUN/RETRIEVE RISER EQUIP.
	[unused]	32	SURFACE TESTING
	[unused]	33	OPERATING STATUS
	[unused]	34	SAFETY
	[unused]	35	WELL CONTROL
		36	COILED TUBING
A	PERFORATING	37	COMPLETION ACTIVITIES
B	TUBING TRIPS		[All completion codes are grouped into one]
C	TREATING		
D	SWABBING		
E	TESTING		
	[unused]	38	SUBSEA INSTALATIONS

2 – To add granularity to the 38 Operation codes, 196 Activity, 26 Sub-activity, 200 Equipment and 26 Sub-equipment codes have been identified (see appendix 4.3 to 4.7).

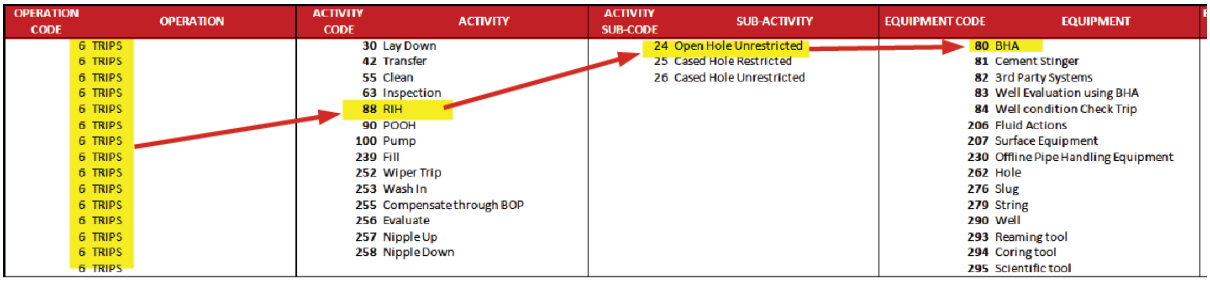
3 – Minor corrections and additions have been made following studies of best practices by IADC members.

2.5 How will the new code/subcode system work?

The new code/subcode set cascades neatly to allow selection for each Operation, as represented by a base code, 1-34, the appropriate Activity, Sub-activity, piece of Equipment, and Sub-equipment. A "No Specifics" option is provided, if no selection is desired for a given subcode.

Each item within each subcode, whether for Activity, Sub-activity, Equipment, or Sub-equipment, is represented by a unique numeral. For example, the Activity "Drills" is a selection under three separate main Codes[1], and is always represented by the Activity code 23. Similarly, the Equipment "Topdrive" is always represented by the numeral 4 in each of the three main Codes in which is can be found.[2]

The user selects the appropriate main code, then selects from the cascades of Activity, Sub-activity, Equipment, and Sub-equipment codes, as relevant. See the example:



Main code (Operation) | **Activity** | **Sub-activity** | **Equipment**

Note: Sub-equipment is not shown, but available for many main codes

6.88.24.80 = Trips, RIH, Open Hole Unrestricted, BHA

2.6 Why does the DDR Plus™ now have a digital schema?

Requested by IADC Members, the DDR Plus™ schema allows the DDR Plus™ data to be easily and logically stored, transferred and analyzed.

2.7 How does the DDR Plus™ schema work?

Each piece of information (letters, numbers, words) entered into the DDR Plus™ will have a place in the DDR Plus™ schema.

2.8 What is the DDR Plus™ schema?

The DDR Plus™ schema is the standardized digital description of the DDR Plus™. It is a human-readable and machine-readable description of the data that goes into the DDR Plus™.

2.9 Can the schema be used on its own?

The schema is designed to be used in the background, behind a user interface (UI) built by software developers.

[1] Activity code 23 "Drills" is found under Code 2, "Drilling;" 15, "Test BOP;" and 26, "Safety."

[2] Equipment sub-code 4 "Topdrive" is included under the main codes 1, "Rig up/Tear down/ Move;" 2, "Drilling;" and 8, "Rig Repair."

2.10 What code is the schema based on?

The structure of version 2.0 of the DDR Plus™ schema is based on WITSML 1.4.1.1, with additional objects specifically for the DDR Plus™.

2.11 What is WITSML?

Well Information Transfer Standard Markup Language (WITSML) is a data transfer protocol (analogous to HTTP routinely used to send information between machines/electronic devices, via the Internet) specifically developed for the upstream oil and gas industry. Developed by Energistics (see below), it sets out a standard way to send drilling data between machines/electronic devices.

2.12 Who are Energistics?

Energistics is a global, non-profit, membership consortium focused on developing open data exchange standards in the upstream oil and gas industry. They have served the industry for more than 25 years.

2.13 Who is this guide for?

This guide is for anyone wishing to find out more about the transfer of drilling data, but specifically it is for software developers looking to integrate the DDR Plus™ into new and existing software solutions that will generate the DRR Plus, import or export drilling data related to the DDR Plus™.

2.14 Who made the digital schema?

Independent Data Services (IDS) – an international organization with over two decades of DDR-focused experience, producing and transferring data from DDRs - was contracted to design and build the digital version of the DDR Plus™.

2.15 What if I see issues with the DDR Plus™ schema or am struggling to implement it?

Please email IADCsupport@idsdatanet.com

2.16 Will the schema ever be updated?

Yes. Based on feedback from IADC Members, the schema will be updated, and new versions published by the IADC.

2.17 How can I provide input on the DDR Plus™?

Send any feedback or input to DDR_Plus@iadc.org.

3. XML

3.1 Metadata

In IADC DDR plus™ XML specifically, will have the following metadata:

```
xmlns:witsml="http://www.witsml.org/schemas/1series"
xmlns="http://www.iadc.org/schemas"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xsi:schemaLocation="http://www.iadc.org/schemas  ../xsd_schemas/<fileName>.xsd"
```

```
version="1.0.0.0">
```

Default metadata within the XML shall be:

```
xmlns="http://www.witsml.org/schemas/1series"
xmlns:iadc="http://www.iadc.org/schemas"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xsi:schemaLocation="http://www.witsml.org/schemas/1series  ../xsd_schemas/<fileName
.xsd"
version="1.0.0.0">
```

xmlns:iadc - this is only available in XMLs where default WITSML data object is used, but with the additions of IADC fields, i.e. wbGeometry and rig data objects.

3.2 General Structure

The following list shows the data objects that will most likely be queried for IADC DDR Plus™ report:

Data Objects	Description
1. well	Contains details relating to Well, from which well details in the report will reference. This uses WITSML default data object.
2. wellbore	Similar to Well Info, it contains details relating to Wellbore, from which wellbore details in the report will reference. This uses WITSML default data object.
3. rig	Contains details relating to Rig. This uses WITSML default data objects but includes details of Tour data, Rig Pump data and Wireline data, which has been setup for the rig.
4. iadcDdrPlus	This is a new data object, created for IADC DDR Plus™ reporting. It contains daily data that is further broken-down into tours details of the day. Daily data includes - Capacity/Bulk/Stock information - Daily reporting number, and date - Daily Wireline information - Daily Drill Pipe information Tour data includes - Drilling Assembly (a.k.a. Tubular Components) - Drill Pipe data - Mud records - Mud Chemical - Drilling Parameters - Pump data - Deviation Record (a.k.a. Survey Station) - Details of Operations (a.k.a. Activity) - Personnel/Crew on board
5. bhaRun	Contains details on BHA Run, include the reference to the tubular being used in each run. This uses WITSML default data object.
6. tubular	Main information of a tubular, where tubular components shall reference from. This uses WITSML default data object.

7. wbGeometry	Contains Casing/Tubing/Liner details. This uses WITSML default data object, but includes fields used in IADC reporting.

Below is the general structure of each data object:

Note:

Min = minimum record allowed per section. (If Min = 0, means it allows empty data set)
Max = maximum record allowed per section.
Unbounded = unlimited records allow.

If there's no data displayed (for sections where min=0), no data will be available in the XML.

Structure of each Data Object

1. well (sample XML: iadciadcWell.xml)

```
<wells>
    Metadata will go here.

    <well uid="">
        Well specific data will go here.
    </well>

</wells>
```

2. wellbore (sample XML: iadcWellbore.xml)

```
<wellbores>
    Metadata will go here.

    <wellbore uidWell="" uid="">
        Wellbore specific data will go here.
    </wellbore>

</wellbores>
```

3. rig (sample XML: iadcRigInfo.xml)

```
<rigs>
    Metadata will go here.

    <rig uidWell="" uidWellbore="" uid="">
        Rig specific data will go here.

        <iadc:rigTour uid="">
            (min = 2, max = 3)
            Tour information will go here.
            Note that there's "iadc:" referenced here. It means this
            particular data does not belong to rig dat aobject, but an
            addition fields/section to the current dat aobject.
        </iadc:rigTour>

        <pump uid="">
            (min = 0, max = unbounded)
            Rig Pump information will go here.
        </pump>

        <drillLine uid="">
            (min = 0, max = unbounded)
            Drill Line information will go here.
        </drillLine>

    </rig>
```

```
    </rigs>
```

4. iadcDdrPlus (sample XML: iadcDdrPlus.xml)

```
<iadcDdrPluss>
    Metadata will go here.

    <iadcDdrPlus uidWell="" uidWellbore="" uid="">
        Day specific data will go here.
        One iadcDdrPlus for one reporting day.
        Daywork details will go here as well.

        <bulk uid="">
            (min = 0, max = unbounded)
            Bulk/Capacity information will go here.
        </bulk>

        <dailyDrillLine uid="">
            (min = 0, max = unbounded)
            Daily Drill Line information will go here.
        </dailyDrillLine>

        <dailyDrillPipe uid="">
            (min = 0, max = unbounded)
            Daily Drill Pipe information will go here.
        </dailyDrillPipe>

        <tourReport uid="">
            (min = 2, max = 3)
            Tour details will go here.
            Contains tour specific data as well.
            One tourReport per tour.

            <drillPipe uid="">
                (min = 0, max = 1)
                Drill Pipe tour details will go here.
            </drillPipe>

            <fluid uid="">
                (min = 0, max = unbounded)
                Mud Record details will go here.
            </fluid>

            <mudChemical uid="">
                (min = 0, max = unbounded)
                Mud Chemicals details will go here.
            </mudChemical>

            <witsml:drillingParams uid="">
                (min = 0, max = unbounded)
                Drilling Parameters details will go here.
                Note that there's a "witsml:" referenced here. It's
                because this XML is specific to IADC, but would like to
                use data objects from WITSML 1.4.1.1.
            </witsml:drillingParams>

            <pumpParam uid="">
                (min = 0, max = unbounded)
                Pump Liner/SPM details will go here.
            </pumpParam>

            <trajectoryStation uid="">
                (min = 0, max = unbounded)
                Deviation details will go here.
            </trajectoryStation>

            <activity uid="">
```

```
                        (min = 0, max = unbounded)
                        Activity details will go here.
                        IADC Operation/Activity/Sub-Activity/Equipment/Sub-
                        Equipment codes has been predefined. Refer to Appendix
                        5.3. – 5.7. for list of codes.
                </activity>

                <personnel uid="">
                        (min = 0, max = unbounded)
                        Personnel/Crew details will go here
                </personnel>

        </tourReport>
    </iadcDdrPlus>
</iadcDdrPluss>
```

5. bhaRun (sample XML: bhaRun.xml)

```
<bhaRuns>
    Metadata will go here

    <bhaRun uidWell="" uidWellbore="" uid="">
        BHA Run information will go here.
        This data object is used to determine the set the tubular components
        that's being used in a tour.

        <drillingParams uid="">
            (min = 0, max = unbounded)
            Drilling Parameters details will go here.
        </drillingParams>
    </bhaRun>

</bhaRuns>
```

6. tubular (sample XML: iadcTubular.xml)

```
<tubulars>
    Metadata will go here.

    <tubular uidWell="" uidWellbore="" uid="">
        Tubular/BHA Run information will go here.

        <tubularComponent uid="">
            (min = 0, max = unbounded)
            Drilling Assembly details will go here.
            One tourTubularComponet per Drilling Assembly/BHA Component.
            Tubular Component type has been predefined in WITSML 1.4.1.1,
            refer to Appendix 5.10 for list of Tubular Component.

            <bitRecord uid="">
                (min = 0, max = 1)
                Bit Repord details will go here.
                Only available if component is Bit.
                Bit Type has been predefined in WITSML 1.4.1.1, refer to
                Appendix 5.1 for list of Bit Type.
            </bitRecord>
            <nozzle uid="">
                (min = 0, max = unbounded)
                Nozzles/Jets details will go here.
            </nozzle>
        </tubularComponent>

    </tubular>
```

7. wbGeometry (sample XML: iadcWbGeometry.xml)

```
<wbGeometrys>
    Metadata will go here
```

```
        <wbGeometry uidWell="" uidWellbore="" uid="">
                (min = 0, max = unbounded)
                One wbGeometry per wellbore.

                <wbGeometrySection uid="">
                (min = 0, max = unbounded)
                Casing specific information will go here.
                Casing Type has been predefined in WITSML 1.4.1.1, refer to Appendix 5.2.
                for list of Casing Type.
                </wbGeometrySection>
        </wbGeometry>

    </wbGeometrys>
```

3.3 Units

uom attributes are seen for fields that have units. Please note, these units are not fixed, and they can be converted to other units, so long as they are in the same unit family.

```
<fluid uid="fluid001">
<dTim>2001-10-21T00:10:00.000Z</dTim>
<weightDens uom="lbm/galUS">4</weightDens>
<pressureGradient uom="psi/ft">5</pressureGradient>
<visFunnel uom="s">54</visFunnel>
<pv uom="cP">17</pv>
<yp uom="lbf/100ft2">27</yp>
<gel10Sec uom="lbf/100ft2">10</gel10Sec>
<gel10Min uom="lbf/100ft2">7</gel10Min>
<filtrateLtlp uom="mL">3.8</filtrateLtlp>
<ph>10</ph>
<solid uom="%">2</solid>
</fluid>
```

All units in the schema are from the Energistics UOM system, which can be found in typ_quantityClass.html of the WITSML 1.4.1.1 Data Schema Overview from Energistics.

3.4 Overview

Take note of the following while inspecting the XML samples:

1. XML will query all records for the day. Take for example, in Deviation, there maybe 30 or more entries of Deviation from the data source. All these records will be queried into XML without any filter (i.e., to query only latest 6 records). The only filter applicable is data being segregated into Tours.
2. uidRef is sometimes seen – i.e., <tubular uidRef="tub001">TubAssy001</tubular>. This is a reference to the unique identifier (uid attribute) in the node referenced by the name value.
3. All data queried is directly from data source. Hence, no sum/auto-calculation logic is applied to any of the fields.

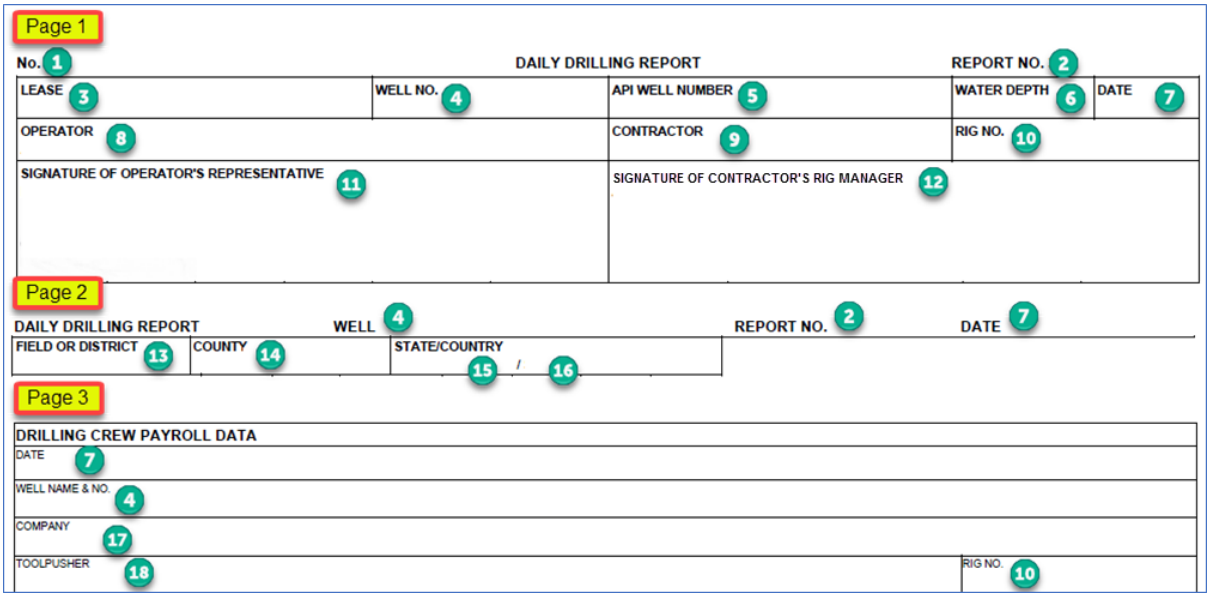
3.5 Sample XML for each Data Object

Attached below are sample XMLs for each data object.

Sample XMLs - 20190925.zip

4. IADC Mapping

4.1 Well Information

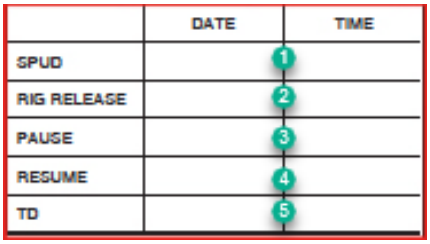


No	Column Label	Data Object	Path
1	No. ([1]Rig Abbreviation)_ (*[2]Wellname)_(*[3]Report Number)	[1]rig	rig/iadc:rigNameAbbrev
		[2]iadcDdrPlus	iadcDdrPlus/nameWell
		[3]iadcDdrPlus	iadcDdrPlus/name
2	*Report No.	iadcDdrPlus	iadcDdrPlus/name
3	Lease	iadcDdrPlus	iadcDdrPlus/refLease
4	*Well No. /Well Name	iadcDdrPlus	iadcDdrPlus/nameWell
5	API Well Number	Well	well/numAPI
6	Water Depth *(for offshore operation)*	well	well/waterDepth
	Ground Level *(for onshore operation)*		well/groundElevation
7	*Date	iadcDdrPlus	iadcDdrPlus/dTim
8	Operator	iadcDdrPlus	iadcDdrPlus/operatorCompany
9	Contractor	iadcDdrPlus	iadcDdrPlus/contractorCompany
10	*Rig No.	iadcDdrPlus	iadcDdrPlus/rig
11	Signature (*and name)* of Operator's Rep.	iadcDdrPlus	iadcDdrPlus/operatorPersonnel
12	Signature (*and name)* of Contractor's Rig Manager	iadcDdrPlus	iadcDdrPlus/contractorPersonnel
13	Field or District	well	well/field
14	County	well	well/county

15	State	well	well/state
16	Country	well	well/country
17	Company	iadcDdrPlus	iadcDdrPlus/contractorCompany
18	Toolpusher	iadcDdrPlus	iadcDdrPlus/toolpusher

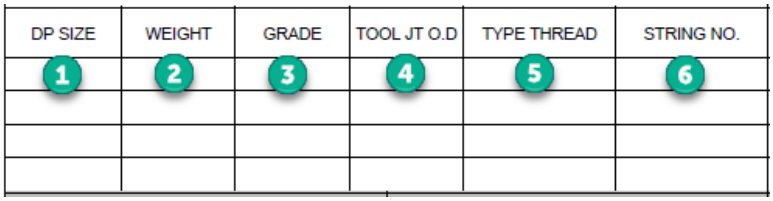
** = Mandatory values required in XML*

4.1.1. Date/Time



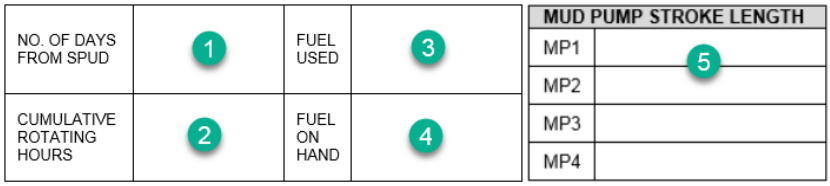
No	Column Label	Data Object	Path
1	Spud Date/Time	iadcDdrPlus	iadcDdrPlus/dTimSpud
2	Rig Release Date/Time	Well	well/iadc:dTimRigRelease
3	Pause Date/Time	iadcDdrPlus	iadcDdrPlus/dTimOperationPause
4	Resume Date/Time	iadcDdrPlus	iadcDdrPlus/dTimOperationResume
5	TD Date/Time	wellbore	wellbore/iadc:dTimTargetDepth

4.2 Drill Pipe



Data Object = iadcDdrPlus		
No	**Column Label**	**Path**
1	DP SIZE	iadcDdrPlus/dailyDrillPipe/drillPipeSize
2	WEIGHT	iadcDdrPlus/dailyDrillPipe/wtPerLen
3	GRADE	iadcDdrPlus/dailyDrillPipe/grade
4	TOOL JT O.D	iadcDdrPlus/dailyDrillPipe/toolJtOd
5	TYPE THREAD	iadcDdrPlus/dailyDrillPipe/typeThread
6	STRING NO.	iadcDdrPlus/dailyDrillPipe/stringNo

4.3 Days fr. Spud/ Cum. Rotating Hours/Fuel Amount / Mud Pump



No	Column Label	Data Object	Path
1	No. of Days fr. Spud	iadcDdrPlus	iadcDdrPlus/eTimSpud
2	Cumulative Rotating Hours	*iadcDdrPlus*	*No mapping applicable, as this field can be calculated base on values obtained from* iadcDdrPlus/eTimDrillRot
3	Fuel Used	iadcDdrPlus	iadcDdrPlus/bulk/witsml:qtyUsed
4	Fuel on Hand	iadcDdrPlus	iadcDdrPlus/bulk/witsml:qtyOnLocation
5	MUD PUMP STROKE LENGTH	rig	rig/pump/lenStroke, according to Pump No. (*rig/pump/index) i.e. Populate for MP1 stroke length, for Pump No. = 1

** = Mandatory values required in XML*

4.4 Time Distribution

TIME DISTRIBUTION – HOURS		
CODE NO. – OPERATION	1	2
1. RIG UP / TEAR DOWN / MOVE		
2. DRILLING		
3. REAMING		
4. CORING		
5. CIRCULATE & CONDITION MUD		
6. TRIPS		
7. SERVICE/MAINTAIN RIG		
8. REPAIR RIG		
9. REPLACING DRILL LINE		
10. DEVIATION SURVEY		
11. WIRELINE LOGS		
12. RUN CASING & CEMENT		
13. WAIT ON CEMENT		
14. RIG UP / DOWN BOP		
15. TEST BOP		
16. DRILL STEM TEST		
17. PLUG BACK		
18. SQUEEZE CEMENT		
19. FISHING		
20. SPECIALIZED DIRECTIONAL WORK		
21. OTHER		
22. OTHER		
23. OTHER		
31. RUN/RETRIEVE RISER EQUIP.		
32. SURFACE TESTING		
33. OPERATING STATUS		
34. SAFETY		
35. WELL CONTROL		
36. COILED TUBING		
37. COMPLETION ACTIVITIES		
38. SUBSEA INSTALLATIONS		
TOTALS		

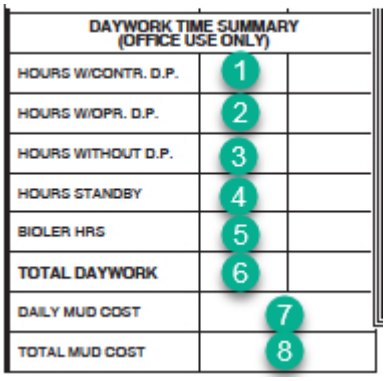
No mapping done for Time Distribution section.

Raw values (values where no calculation/logic applied) can be obtained from `iadcDdrPlus/tourReport/tourActivity` section; whereby each it records one duration, and one code per activity event (may refer to 4.14 Time Log for details on each field):

```
<tourReport uid="tourDayReportUidHere">
        <tourActivity uid="activityUidHere">
                <dTimStart>2001-10-21T00:00:00.000Z</dTimStart>
                <dTimEnd>2001-10-21T00:30:00.000Z</dTimEnd>
                <duration uom="h">0.5</duration>
                <iadcOpsCode>1</iadcOpsCode>
                <iadcActivityCode>0</iadcActivityCode>
                <iadcSubActivityCode>0</iadcSubActivityCode>
                <iadcEquipCode>0</iadcEquipCode>
                <iadcSubEquipCode>0</iadcSubEquipCode>
                <remark>Activity remarks here</remark>
        </tourActivity>
</tourReport>
```

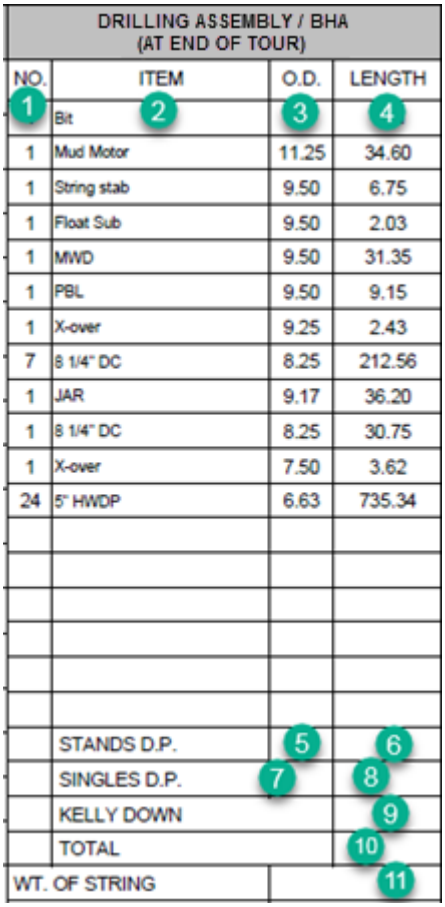
Refer to next page for Daywork Time Summary mapping.

4.4.1. Daywork Time Summary



Data Object = rig		
No	**Column Label**	**Path**
1	Hours w/condtr D.P.	iadcDdrPlus/tourReport/eTimContractorDp
2	Hours w/opr D.P.	iadcDdrPlus/tourReport/eTimOperatorDp
3	Hours without D.P.	iadcDdrPlus/tourReport/eTimWithoutDp
4	Hours standby	iadcDdrPlus/tourReport/eTimStandby
5	Boiler Hrs	iadcDdrPlus/tourReport/eTimBoiler
6	Total Daywork	*No mapping applicable, as this field can be calculated base on values obtained from #1-4 above.*
7	Daily Mud Cost	iadcDdrPlus/dailyMudCost
8	Total Mud Cost	*No mapping applicable, as this field can be calculated base on value obtained from #8. Daily Mud Cost.*

4.5 Drilling Assembly / BHA



DRILLING ASSEMBLY / BHA (AT END OF TOUR)			
NO. 1	ITEM 2	O.D. 3	LENGTH 4
1	Bit		
1	Mud Motor	11.25	34.60
1	String stab	9.50	6.75
1	Float Sub	9.50	2.03
1	MWD	9.50	31.35
1	PBL	9.50	9.15
1	X-over	9.25	2.43
7	8 1/4" DC	8.25	212.56
1	JAR	9.17	36.20
1	8 1/4" DC	8.25	30.75
1	X-over	7.50	3.62
24	5" HWDP	6.63	735.34
	STANDS D.P. 5		6
	SINGLES D.P. 7		8
	KELLY DOWN		9
	TOTAL		10
WT. OF STRING			11

Data Object = tubular		
No	**Column Label**	**Path**
1	*NO.	tubular/tubularComponent/numJointStand
2	*ITEM	tubular/tubularComponent/typeTubularComp *With this value queried, refer to Appendix 5.10 for the full description of the bit type, and other bit types available.*
3	*O.D.	tubular/tubularComponent/od
4	*LENGTH	tubular/tubularComponent/len

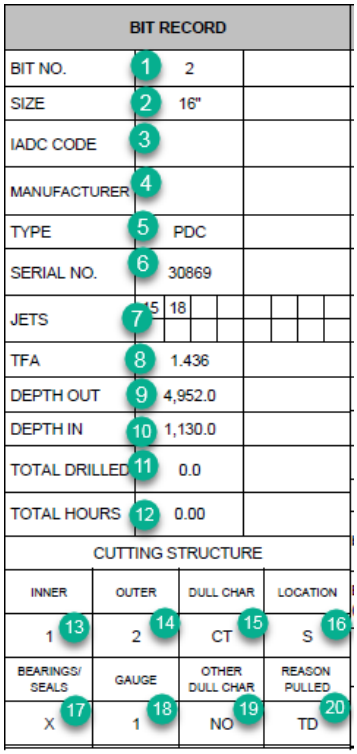
** = Mandatory values required in XML*

Drill Pipe

Data Object = iadcDdrPlus		
No	**Column Label**	**Path**
5	Stands D.P. (O.D)	iadcDdrPlus/tourReport/drillPipe/standsDpSize
6	Stands D.P. (Length)	iadcDdrPlus/tourReport/drillPipe/standsDpLength
7	Singles D.P. (O.D)	iadcDdrPlus/tourReport/drillPipe/singleDpSize
8	Singles D.P. (Length)	iadcDdrPlus/tourReport/drillPipe/singleDpLength
9	Kelly Down	iadcDdrPlus/tourReport/drillPipe/kellyDownLength

10	Total (Length)	*No mapping applicable, as this field can be calculated base on values obtained from #6, 8, 9 above.*
11	Wt. of String	iadcDdrPlus/tourReport/drillPipe/stringWeight

4.6 Bit Record



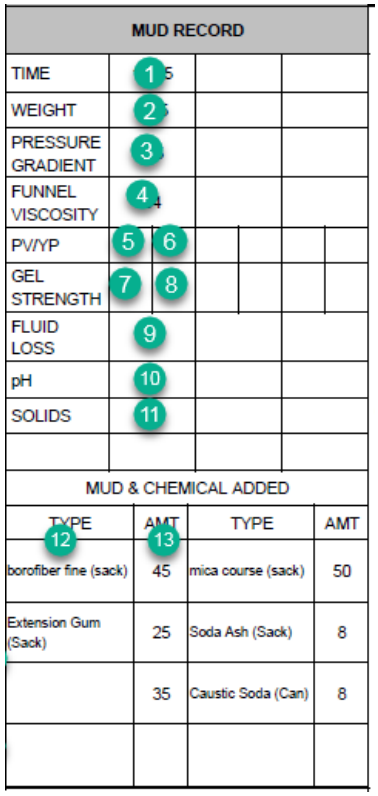
Data Object = tubular, iadcDdrPlus		
No	**Column Label**	**Path**
1	*Bit No.	tubular/tubularComponent/bitRecord/numBit
2	Size	tubular/tubularComponent/bitRecord/diaBit
3	IADC Code	tubular/tubularComponent/bitRecord/codeIADC
4	Manufacturer	tubular/tubularComponent/bitRecord/manufacturer
5	Type	tubular/tubularComponent/bitRecord/typeBit *Only enumeration value is displayed.* *For example:* `<typeBit>`PDC`</typeBit>` *With this value queried, refer to Appendix 5.1 for the full description of the bit type, and other bit types available.*
6	Serial No	tubular/tubularComponent/bitRecord/codeMfg
7	Jets	tubular/tubularComponent/nozzle/diaNozzle
8	TFA	tubular/tubularComponent/areaNozzleFlow
9	Depth Out	tubular/tubularComponent/bitRecord/iadc:mdDepthOut
10	Depth In	tubular/tubularComponent/bitRecord/iadc:mdDepthIn
11	Total Drilled	iadcDdrPlus/distDrill
12	Total Hours	iadcDdrPlus/eTimDrillRot

** = Mandatory values required in XML*

Cutting Structure

Data Object = iadcDdrPlus		
No	**Column Label**	**Field**
13	Inner	tubular/tubularComponent/bitRecord/condFinalInner
14	Outer	tubular/tubularComponent/bitRecord/condFinalOuter
15	Dull Char	tubular/tubularComponent/bitRecord/condFinalDull
16	Location	tubular/tubularComponent/bitRecord/condFinalLocation
17	Bearings/Seals	tubular/tubularComponent/bitRecord/condFinalBearing
18	Gauge	tubular/tubularComponent/bitRecord/condFinalGauge
19	Other Dull Char	tubular/tubularComponent/bitRecord/condFinalOther
20	Reason Pulled	tubular/tubularComponent/bitRecord/condFinalReason

4.7 Mud Record



Data Object = iadcDdrPlus		
No	**Column Label**	**Path**
1	*Time	iadcDdrPlus/tourReport/fluid/dTim
2	Weight	iadcDdrPlus/tourReport/fluid/weightDens
3	Pressure Gradient	iadcDdrPlus/tourReport/fluid/pressureGradient
4	Funnel Viscosity	iadcDdrPlus/tourReport/fluid/visFunnel

5	PV	iadcDdrPlus/tourReport/fluid/pv
6	YP	iadcDdrPlus/tourReport/fluid/yp
7	Gel Strength (10s)	iadcDdrPlus/tourReport/fluid/gel10Sec
8	Gel Strength (10m)	iadcDdrPlus/tourReport/fluid/gel10Min
9	Fluid Loss	iadcDdrPlus/tourReport/fluid/filtrateLtlp
10	pH	iadcDdrPlus/tourReport/fluid/ph
11	Solids	iadcDdrPlus/tourReport/fluid/solid

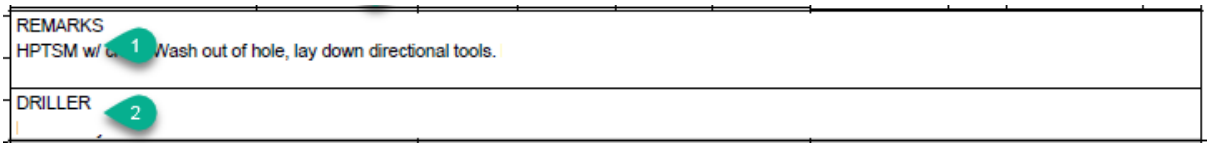
** = Mandatory values required in XML*

Mud & Chemical Added

Data Object = iadcDdrPlus		
No	**Column Label**	**Path**
12	*Type	iadcDdrPlus/tourReport/mudChemical/chemicalType
13	Amt	iadcDdrPlus/tourReport/mudChemical/amount

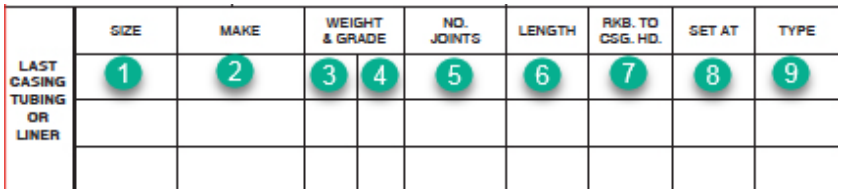
** = Mandatory values required in XML*

4.8 Driller/Remark



Data Object = iadcDdrPlus		
No	**Column Label**	**Path**
1	Remarks	iadcDdrPlus/tourReport/rptSignOffRemark
2	Driller	iadcDdrPlus/tourReport/rptSignOffPersonnel

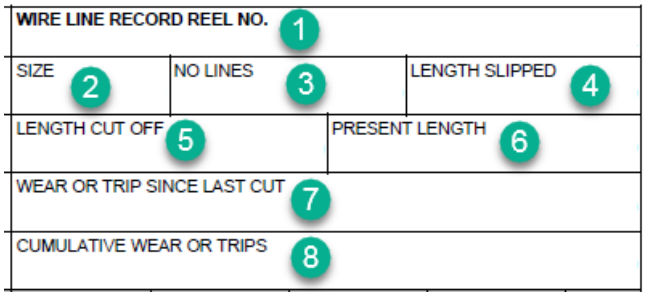
4.9 Casing



Data Object = wbGeometry		
No	**Column Label**	**Path**
1	Size	wbGeometry/wbGeometrySection/odSection
2	Make	wbGeometry/wbGeometrySection/iadc:make
3	Weight	wbGeometry/wbGeometrySection/wtPerLen
4	Grade	wbGeometry/wbGeometrySection/grade
5	No. Joints	wbGeometry/wbGeometrySection/iadc:noOfJoints

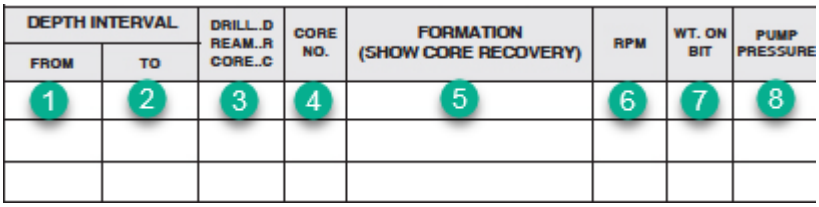
6	Length	wbGeometry/wbGeometrySection/iadc:len
7	RKB to Csg. Hd.	wbGeometry/wbGeometrySection/iadc:datumRefCsgHeadMd
8	Set At	wbGeometry/wbGeometrySection/iadc:csgLandedDepthMd
9	Type	wbGeometry/wbGeometrySection/typeHoleCasing *Only enumeration value is displayed.* *For example:* `<typeHoleCasing>`PDC`</typeHoleCasing>` *With this value queried, refer to Appendix 5.2 for the full description of the bit type, and other bit types available.*

4.10 Wireline



No	Column Label	Data Object	Path
1	Reel no.	rig	rig/iadc:drillLine/iadc:reelNumber
2	Size	rig	rig/iadc:drillLine/iadc:lineSize
3	No. Lines	rig	rig/iadc:drillLine/iadc:numberOfLines
4	Length Slipped	iadcDdrPlus	iadcDdrPlus/dailyDrillLine/slippedLength
5	Length Cut Off	iadcDdrPlus	iadcDdrPlus/dailyDrillLine/cutOffLength
6	Present Length	iadcDdrPlus	iadcDdrPlus/dailyDrillLine/presentLength
7	Wear or Trip since Last Cut	iadcDdrPlus	iadcDdrPlus/dailyDrillLine/wearSinceLastCut
8	Cumulative Wear or Trips	iadcDdrPlus	iadcDdrPlus/dailyDrillLine/accumDailyWear

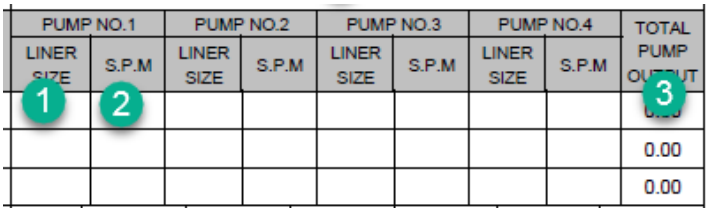
4.11 Drilling Parameters



Data Object = iadcDdrPlus		
No	**Column Label**	**Path**
1	Depth From	iadcDdrPlus/tourReport/witsml:drillingParams/witsml:mdHoleStart
2	Depth To	iadcDdrPlus/tourReport/witsml:drillingParams/witsml:mdHoleStop
3	Drill/Ream/Core	iadcDdrPlus/tourReport/witsml:drillingParams/drillMode *Only enumeration value is displayed.*

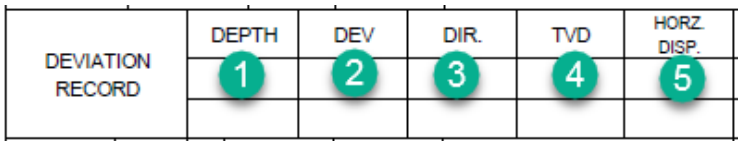
		For example: `<drillMode>D</drillMode>` *With this value queried, refer to Appendix 5.8 for the description of the drill mode, and other drill modes available.*
4	Core No.	iadcDdrPlus/tourReport/witsml:drillingParams/coreNumber
5	Formation	iadcDdrPlus/tourReport/witsml:drillingParams/formationName
6	RPM	iadcDdrPlus/tourReport/witsml:drillingParams/rotaryTableSpeed
7	Wt. on Bit	iadcDdrPlus/tourReport/witsml:drillingParams/wobAvgMass
8	Pump Pressure	iadcDdrPlus/tourReport/witsml:drillingParams/standpipePressure

4.12 Pump Data



Data Object = iadcDdrPlus		
No	**Column Label**	**Path**
1	Liner Size	iadcDdrPlus/tourReport/pumpParam/idLiner
2	S.P.M.	iadcDdrPlus/tourReport/pumpParam/pressure
3	Pump Output	There's no direct mapping to the total, but the total can be calculated by taking the values from iadcDdrPlus/tourReport/pumpParam/pumpOutput.

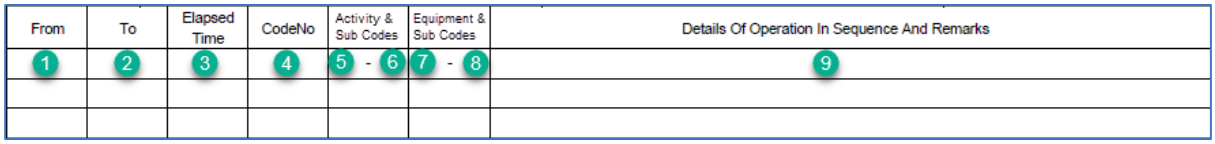
4.13 Survey Record



Data Object = iadcDdrPlus		
No	**Column Label**	**Path**
1	*Depth	iadcDdrPlus/tourReport/trajectoryStation/idLiner
2	Dev	iadcDdrPlus/tourReport/trajectoryStation/incl
3	Dir	iadcDdrPlus/tourReport/trajectoryStation/azi
4	TVD	iadcDdrPlus/tourReport/trajectoryStation/tvd
5	Horz. Disp.	iadcDdrPlus/tourReport/trajectoryStation/dir

** = Mandatory values required in XML*

4.14 Time Log (Activity)



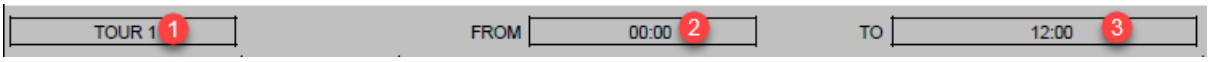
Data Object = iadcDdrPlus		
No	**Column Label**	**Path**
1	From	iadcDdrPlus/tourReport/activity/dTimStart
2	To	iadcDdrPlus/tourReport/activity/dTimEnd
3	Elapsed Time	iadcDdrPlus/tourReport/activity/duration
4	*CodeNo	iadcDdrPlus/tourReport/activity/iadcOpsCode
5	*Activity Code	iadcDdrPlus/tourReport/activity/iadcActivityCode
6	*Sub-Activity Code	iadcDdrPlus/tourReport/activity/iadcSubActivityCode
7	*Equipment Code	iadcDdrPlus/tourReport/activity/iadcEquipCode
8	*Sub-Equipment Code	iadcDdrPlus/tourReport/activity/iadcSubEquipCode
9	Remarks	iadcDdrPlus/tourReport/activity/remark

* NOTE: In IADC, each operation/activity/equipment code is represented by a number. Therefore, in the XML, only code numbers are populated. For example:

```
<iadcOpsCode>2</iadcOpsCode>
<iadcActivityCode>0</iadcActivityCode>
<iadcSubActivityCode>0</iadcSubActivityCode>
<iadcEquipCode>0</iadcEquipCode>
<iadcSubEquipCode>0</iadcSubEquipCode>
```

Refer to Appendix 5.3 – 5.7 for the name of each code, and other codes available for each of them.

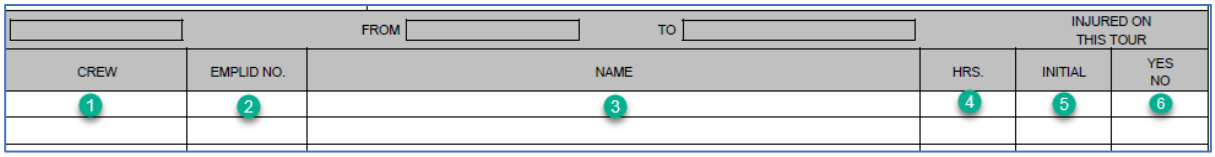
4.15 Tour Details



Data Object = rig		
No	**Column Label**	**Path**
1	*Tour (Number)	rig/iadc:rigTour/iadc:tourNumber. *Only enumeration value is displayed.* *For example:* `<tourNumber>1</tourNumber>` *With this value queried, refer to Appendix 5.9 for the description of the tour, and other tour names available.*
2	From	rig/iadc:rigTour/iadc:dTimTourStart
3	To	rig/iadc:rigTour/iadc:dTimTourEnd

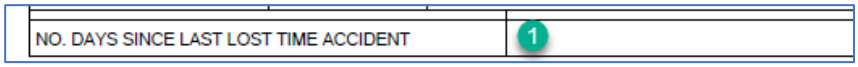
* NOTE: Standard naming applied as the tour's name – Tour 1, Tour 2, Tour 3.

4.16 Crew on board



Data Object = iadcDdrPlus		
No	**Column Label**	**Path**
1	Crew	iadcDdrPlus/tourReport/personnel/crewPosition
2	Empl ID No.	iadcDdrPlus/tourReport/personnel/crewNumber
3	Name	iadcDdrPlus/tourReport/personnel/crewName
4	Hrs	iadcDdrPlus/tourReport /personnel/totalTime
5	Injured initially?	iadcDdrPlus/tourReport /personnel/isInitiallyInjured
6	Injured in this tour?	iadcDdrPlus/tourReport /personnel/isInjured

4.17 Days since Last Lost Time Accident



Data Object = iadcDdrPlus		
No	**Column Label**	**Path**
1	No. Days Since Last Lost Time Accident	iadcDdrPlus/eTimAccidentFree

5. Appendix

All listing values in this appendix are correct as of Jan 2019.

5.1 Bit Type Listing

Below listing is the standard list of Bit Type provided in WITSML 1.4.1.1. (Reference: Link)
This is being used: `tubular/tubularComponent/bitRecord/typeBit`

Enumeration value (Short Code)	Description
diamond	Diamond bit
diamond core	Diamond core bit
insert roller cone	Insert roller cone bit
PDC	Polycrystalline diamond compact fixed cutter bit
PDC core	Polycrystalline diamond compact core bit
roller cone	Milled tooth roller cone bit
unknown	*For other bit types other than above.*

5.2 Casing Type Listing

Below listing is the standard list of Casing Type provided in WITSML 1.4.1.1. (Reference: Link)
This can be found in: `wbGeometry/wbGeometrySection/typeHoleCasing`

Enumeration value (Short Code)	Description

blow out preventer	-
casing	-
conductor	-
curved conductor	-
liner	-
open hole	-
riser	-
tubing	-
unknown	*For other casing types other than above.*

5.3 IADC Operation Codes

Below listing is the standard list of IADC Operation codes, provided by IADC Members.

This is being used in: `iadcDdrPlus/tourReport/activity/iadcOpsCode`

Enum. value (Short Code)	Description	
1	RIG UP /TEAR DOWN /MOVE	Rig up is the on-site erection and connection of rig components in preparation for drilling or well servicing operations. Rig up begins when the first rig components have arrived at the wellsite, and ends when the rig is ready to spud the well. "Tear Down" is the act of dismantling a rig at the completion of a well and preparing it for moving to the next location. Tear Down begins when the first portion of the drilling rig is dismantled, and ends when the entire rig when the last rig component has left the wellsite. This section also includes all offshore rig movements and activities around rig movements.
2	DRILLING	Drilling is boring a hole into the earth with the purpose of finding and producing oil, natural gas, or other subsurface resource. Drilling can also be used for drilling out shoe tracks and dressing off cement plugs. Time starts once boring (“making new hole”) begins, and time ends when boring ceases.
3	REAMING	Reaming refers to the operations of smoothing the wellbore, enlarging the hole to the desired size, straightening dog legs, or assisting in directional drilling. Reaming begins when the rig begins rotating and circulating for any of the purposes described in the first sentence. Reaming ends when this rotation and circulation cease.
4	CORING	Coring is the extraction from the wellbore of a cylindrical sample for geological analysis. Coring begins when rotation begins for the purpose of capturing a cylindrical sample of rock. Coring ends when the process of capturing the cylindrical sample ceases.
5	CIRCULATE & CONDITION MUD	Conditioning is the process of preparing the drilling fluid (“mud”) to modify fluid properties (such as weight, viscosity, etc) for use down hole, circulate means pumping the fluid through the drill pipe. Process begins when additives are blended into the drilling fluid. Process ends when circulation is complete, and pumps shut down.
6	TRIPS	Tripping is the process of lowering or recovering the BHA to or from a desired depth. Operation begins with picking up the BHA on surface or retrieving the BHA from desired depth, and ends when the BHA has reached the desired depth or is laid down on the surface. Occasionally, special trips are made to partially recover and lower the BHA to a desired depth to ensure the quality of the open hole, including hole cleaning efficiency, identifying tight zones or mud-weight sufficiency.
7	SERVICE/MAINTAIN RIG	Rig Service and maintenance is the process of prolonging equipment life or maintain equipment efficiency. Generally classified as planned maintenance, but can be further sub-classified into time-based, condition-based and usage-based. Process begins when the equipment is taken off line for remediation, and ends when the equipment is back in service.

8	REPAIR RIG	Rig repair is a reactive process to correct unknown or unanticipated equipment failure, resulting in operational downtime and impacts critical path. Rig repair begins when the equipment fails, and ends when the equipment is back in service.
9	REPLACING DRILL LINE	Replacing drill line begins when the drawworks is removed from service for this activity and ends when the drawworks is returned to service. Typically, this activity involves spooling in a new supply line and moving worn line toward the drawworks, where it is either severed or spooled onto a winch.
10	DEVIATION SURVEY	The deviation survey is the process of measuring borehole trajectory on the critical path.
11	WIRELINE LOGS	Wireline logging is the process of taking formation measurements or testing well integrity using a tool run into the hole on an electric wire. Process begins when the logging tools are assembled and run into the hole, and ends when the tools are fully retrieved.
12	RUN CASING & CEMENT	The operation includes all procedures necessary to run casing into the hole, make up the casing pipe, and pump cement around the pipe to secure the casing. Operation begins when casing equipment is rigged up, and ceases when the last of the cement is properly placed in the hole.
13	WAIT ON CEMENT	Waiting on Cement (WOC) is the time during which drilling or completion operations are suspended so that the cement in a well can harden sufficiently. Begins when cement pumps are shut down, and ends following tests to determine that the cement has hardened sufficiently.
14	RIG UP/DOWN BOP	This operation refers to dry BOP stacks, i.e., BOPs that are not subsea. Rigging up the BOP is begun when all BOP components are on site, and the crew begins assembling the unit. Rig up ceases when the complete BOP stack is installed and ready for use or testing at the wellsite.
15	TEST BOP	BOP testing begins when the process of checking the device for functionality begins, and ends after all relevant measurements are made and approved.
16	DRILL STEM TEST	The drill stem test begins with picking up temporary packers used to isolate the zone of interest. The test ends when all tools are fully tripped out of the hole.
17	PLUG BACK	Plugging back begins when the plug or cement head is run into the hole, and ends when the plugging tools are returned to the surface.
18	SQUEEZE CEMENT	Squeeze cementing begins when the process of rigging up squeeze cementing equipment begins, and ends when squeeze cement equipment is rigged down.
19	FISHING	Fishing begins when the fishing assembly is rigged up or picked up, and ceases when the fishing assembly has been returned to the surface.
20	SPECIALIZED DIRECTIONAL WORK	Specialized directional work begins when the drill bit and assembly begin deviating from the primary wellbore. Directional work ceases when the directional assembly and drill bit have been rigged down. Otherwise, this category is superseded by subcodes within Code 2 “Drilling.”
21	OTHER	
22	OTHER	
23	OTHER	
31	RUN/ RETRIEVE RISER EQUIPMENT	
32	SURFACE TESTING	
33	OPERATING STATUS	These codes become applicable when a rig is not performing well operations, beginning and ending with the change of status.
34	SAFETY	Activities to sustain safe operations include safety meetings, training, clean up, standdowns, Job Safety Analyses and drills.
35	WELL CONTROL	Well control constitutes remedial and containment actions taken to return the well to a safe state following a loss of hydrostatic control.

36	COILED TUBING	Coiled-tubing operations begins when the equipment is run into the hole, and ends when the tubing is fully retrieved.	
37	COMPLETION ACTIVITIES		
38	SUBSEA INSTALATIONS		

5.4 IADC Activity Codes

Below listing is the standard list of IADC Activity codes, provided by IADC Members:

This is being used in: `iadcDdrPlus/tourReport/activity/iadcActivityCode`

Enum. value (Short Code)	Description
0	No Specifics
1	Logging
2	Rig up
5	Rig Down
16	Flow Check Test
17	Leak Off Test (LOT)
19	Air Drilling
20	Casing Drilling
21	Coiled Tubing Drilling
23	Drills
24	Ream Back
25	Ream Under
26	Ream Open Hole
27	Ream Cement
28	Cut
29	Pick Up
30	Lay Down
42	Transfer
53	Kick Detection Test
54	Hole Open
55	Clean
56	Scheduled Maintenance
57	Unscheduled Maintenance
58	Condition Based Maintenance
59	Mill
60	Slide Drilling
61	Test
62	Change
63	Inspect
64	Work Pipe
65	Burn Test
66	Calibrate
67	Load Test
68	Expendables
69	Electrical
70	Mechanical
71	Hydraulics
72	Instrumentation
73	Paint
74	Slip & Cut
75	Install
76	Single Shot Survey
77	Multi - Shot Survey
78	Deviation Survey
80	Pressure Test
81	Tool string operations
83	Make Up
84	Drive
85	Jett
86	Soak
87	Rack Back
88	Rig In Hole (RIH)
89	Land
90	Pull Out Of Hole (POOH)
91	Function Test
92	Circulate
94	Release
95	Hang
96	Cut Rough
97	Set Up
98	Displace
99	Mix
100	Pump
101	Remove
102	Lost Circulation
104	Final Cut & Dress
105	Survey
106	Energize
107	De-Energize
108	Pressurize
109	De-Pressurize
110	Lock
111	Unlock
113	Set
115	Transport
117	Inflow Test
121	Pressurize Up
122	Pressurize Down
123	Engage
124	Un-latch
126	Dis Engage
133	Overpull Test
137	Set
138	Trial
139	Welding
144	Spot
145	Weight Test
146	Squeeze
147	Jarring
148	Fishing
150	Handling
151	Waiting
152	Tripping
153	Preparation
154	Verification
155	Move

156	Drilling
157	Tool orientation
159	Install
161	Commission
162	Retrieve
163	Latch
165	Pull Test
166	Transfer Weight
167	Move Over
168	Move Off
169	Scope
171	Change to Drilling
172	Change to Riser Running
173	Investigation
174	Standdown
178	Trip Interruption
179	Stuck Pipe
180	Post-Jarring Inspection
181	Idle Not Under Contract
182	Idle Under Contract
183	Pre-Operating
184	Rig Positioning
184	Force Majeur
185	Yard /Dock Maintenance
186	Stacked - Cold
187	Stacked - Warm
188	Meeting
189	Training
191	Job Safety Analysis
197	Shut-In On Well
198	Well Pressure build up
199	Weighing up Kill Mud
200	Well Kill
201	Diverting
203	Rig Modifications
204	Logistics
205	Supply Vessel Operations
206	Crane Operations
207	Helicopter Operations
208	Radio Silence
209	Exporting from wells
210	Perforate
211	Shut-In Well Perforating
212	Treatment
213	Stimulate
214	Gravel Pack
215	Frack
216	Sand Control
217	Flow Period Test
218	Shut-in Period Test
221	Level
222	Pre-Load
223	Spot
224	Load Off
225	Load Back
226	Seafasten
227	Secure
228	Field Arrival Trials
229	Ballast
230	Deploy
231	Recover
232	Tension
233	Verify location
234	Winch Off Drill
235	Seabed Survey
236	Leg penetration test
237	Jack Up
238	Jack Down
239	Fill
240	Dump
241	Skid Out
242	Skid In
243	Connect
244	Hook Up
245	Secure
246	Build volume
247	Unload well
248	Stab in cementation
249	Pump up survey
250	Slow Pump Rate
251	Change Out
252	Wiper Trip
253	Wash In
255	Compensate through BOP
256	Evaluate
257	Nipple Up
258	Nipple Down
259	Set Back
260	Secure
261	Commence Drilling
262	Drill Off Test
263	Friction test
265	Rotating Drilling
266	Connection
267	Oscillate
269	Weight to Slips
270	Slips to Weight
271	In Slips
272	Ream Downwards
273	Stand Down
274	Fracking

5.5 IADC Sub-Activity Codes

Below listing is the standard list of IADC Sub-Activity codes, provided by IADC Members

This is being used in: `iadcDdrPlus/tourReport/activity/iadcSubActivityCode`

Enum. value (Short Code)	Description
0	No Specifics
1	Dry Tow
2	Wet Tow
3	Self Propelled
4	Self Propeller BOP Deployed
5	Land

6	No Surface Back Pressure
7	With Surface Back Pressure
8	Main Well
9	Auxiliary Well
10	Mousehole
11	Rat Hole
12	Reciprocating
13	Static
14	Open Hole
15	Cased Hole
16	Bull Heading

17	Paid - Full Dayrate
18	Paid - Reduced Dayrate
19	In Slips
20	Unpaid
21	Wait and Weight
22	Drillers Method
23	Open Hole Restricted
24	Open Hole Unrestricted
25	Cased Hole Restricted
27	Cased Hole Unrestricted

5.6 IADC Equipment Codes

Below listing is the standard list of IADC Equipment codes, provided by IADC Members.
This is being used in: `iadcDdrPlus/tourReport/activity/iadcEquipCode`

Enum. value (Short Code)	Description
0	No Specifics
2	Jack Up
4	Topdrive
52	EDS Simulation
64	Coiled Tubing
65	Drill Pipe
66	Logging While Drilling (LWD)
67	Inner Barrel
68	Outer Barrel
80	Bottom Hole Assembly (BHA)
81	Cement Stinger
82	3rd Party System
83	Well Evaluation using BHA
84	Well condition Check Trip
85	Mud Pump
86	Drawworks
87	Power Generation System
88	Mud system
89	Well Control System
90	Lifting System
91	Marine System
92	Structural System
93	Tubulars
94	Drill Line
95	Drill Line Spool
96	Wireline
100	Conductor
101	Drive Pipe
102	Hammer Assembly
103	Jetting Assembly
104	Final Cut Joint
105	Mud Line Equipment
106	Conductor Tensioners
107	Casing
108	Liner
109	Inner String
110	Cement Stand
111	Downhole Casing Equipment
112	Downhole Cement Equipment
113	Shoe Track
114	Casing /Liner Hanger
115	Liner Packer

116	Downhole Barrier System
120	Slips
121	BOP
122	Bell Nipple
123	Cement Head
124	Cement Lines
125	Casing Liner Equipment
126	Cement Unit
127	Casing Head
128	Wellhead
129	Diverter
130	Overshot
131	Spool Adapter
132	Control Lines
133	Surface lines
134	Choke & Kill Lines
135	Overboard Lines
136	Flow Line
137	Riser Tensioners
140	Emergency Control System
141	WH/BOP connector test
142	Surface Equipment other than Choke Manifold
143	Choke Manifold
144	Testing Tools
145	Test Plug
146	Wear Bushing
147	Mechanical Plug
148	Downhole Equipment
149	Open Hole Barrier
151	Planned
152	Drilling Riser
153	Completion Workover Riser
154	Lower Marine Riser Package (LMRP)
155	Slipjoint
156	Rotary
157	Spider Gimbal
158	Marine Riser Tensioner (MRT) ring
159	Landing Joint
160	Bails /Elevators
161	Storm Loop
162	Gooseneck

163	ADCP
164	Bullseye
165	Riser Recoil System
166	ROV
167	Safety
168	Cementer
169	Contractor
170	Crew General
171	Crew - Welder
172	Daylight
173	Equipment
174	Lease/Location
175	Loggers
176	Operator Personnel
177	Orders
178	Third Party Tools
179	Third Party Personnel
180	Tongs
181	Trucks
182	Fluid
183	Weather
191	Perforating Guns
192	Tubing
193	Production Tubing
194	Screens
195	Workstring
196	Surface Treating Equipment
197	Well Testing
198	Subsea Test Tree
199	Downhole Valve Assembly
200	Perform Inflow Test
201	Well Test Equipment
202	Completion Landing String
203	Hanger
204	Xmas Tree
205	Slick Line
206	Fluid Actions
207	Surface Equipment
211	Landing String
213	Software
217	Cement Slurry
218	Cement Spacer
219	Plugs
220	Deck Management and Securing Equipment on Deck
221	Internal Rig Transfer of Vessel Liquids
222	Off-loading
223	On-loading
224	Bunkering of Fuel Oil
225	Handle Casing, Marine Riser, Drillpipe, Drillcollars on Deck
226	Handling Hazardous Well Fluids On Deck
227	Internal
228	Landing and Departures
229	Refueling
230	Offline Pipe Handling Equipment
234	Ram
235	Wear Bushing
237	Support String

238	Test Tools
239	Formation
240	Accident
241	Incident
242	Rig Floor
243	Ballast System
244	Mud Pits
245	Combustable Gas
246	H2S
247	Vessel
248	Personnel
250	Anchors
251	Beacons
252	Buildings
253	Cantilever
254	Cement
255	Coil
256	Cores
257	Diverter Line Hangers
258	Land Drilling Rig
259	Drillship
260	Float Shoe
261	General Loads
262	Hole
263	Interface Platform
264	Legs
265	Kelly
267	Mooring lines
268	Mooring System
269	Pre-Load Tanks
270	Riser
271	Saltwater Service Tanks
272	Saltwater Service Pumps
273	Section TD
274	Semi Submersible
275	Service Lines
276	Slug
277	Space Out
278	Spud Boat
279	String
280	Stripping
281	Texas Deck
282	To Completion
283	To Oil Base
284	To Underbalanced
285	To Water Base
286	Tool
287	Towing Vessel
288	Weigh down
289	Weigh Up
290	Well
291	Well Center
292	Window
293	Reaming tool
294	Coring tool
295	Scientific tool
296	Turbine
297	Positive Displacement Motor
299	Downhole Motor
300	Rotary Steerable System
301	Secondary Control System

5.7 IADC Sub-Equipment Codes

Below listing is the standard list of IADC Sub-Equipment codes, provided by IADC Members.
This is being used in: `iadcDdrPlus/tourReport/activity/iadcSubEquipCode`

Enum. value (Short Code)	Description
0	No Specifics
1	Surface
2	Subsea
3	Main Well
4	Top drive
5	BSR-Surface
6	Auxiliary Well
7	BSR-Subsea
8	Off
9	On
85	Mud pump
86	Drawworks
194	Screens
208	Stands
209	Doubles
210	Singles
214	Caliper Brake
215	Brake
216	Sensors
231	Rig Floor
232	Pumps
233	Pump Head
234	30" to 36"
235	16" to 22"
236	13" to 14"
237	8 5/8" to 11 7/8"
238	7" and Smaller

5.8 Drilling Parameters Drill Mode Listing

Below listing the standard list for Drill Mode.
This is being used in: `iadcDdrPlus/tourReport/witsml:drillingParams/drillMode`

Enumeration value (Short Code)	Description
D	Drill
R	Ream
C	Core

5.9 Tour Name

Below listing the standard list for the tours
This is being used in: `rig/iadc:rigTour/iadc:tourNumber`

Enumeration value (Short Code)	Description
1	Tour 1
2	Tour 2
3	Tour 3

5.10 Tubular Component Listing

Below listing the standard list for the tubular component defined in WITSML 1.4.1.1. (Reference: Link)

This is being used: `tubular/tubularComponent/typeTubularComp`

Enumeration value (Short Code)	Description
non-magnetic stabilizer	
non-magnetic collar	Drill colllar made from non-magnetic material. Used to avoid magnetic interference with downhole directional measurements.
stabilizer	Drill string component with blades that help keep the drill string away from the sides of the hole.
adjustable kickoff	A sub that is used with a downhole motor to change the direction of the wellbore. It can be adjusted to give a variable angle of deviation.
accelerator	A downhole tool used in conjunction with a jar that stores energy for rapid release when the jar is fired.

	Depending on the operating mode, the energy in tension or compression is stored by means of a mechanical spring or compressible fluid such as nitrogen gas.
rotary steering tool	A downhole tool that can steer the progress of the bit by applying forces to the sides of the hole while drilling with rotating pipe.
sub-bar catcher	
sub-bent	A drill string component that has a fixed bend angle. Used in conjunction with a downhole motor for deviating the wellbore.
bit core diamond	A diamond tipped drill bit used for coring
bit core PDC	Polycrystalline diamond compact core bit.
bit diamond fixed cut	Drill bit with cutters containing diamonds.
bit insert roller cone	Roller cone bit with cutters made from tungsten carbide or other wear resistant material.
bit mill tooth roller cone	Roller cone drill bit with steel teeth.
bit PDC fixed cutter	Polycrystalline diamond compact drill bit.
sub-bit	Drill string component used to connect the drill bit to the rest of the string.
bridge plug	A downhole tool that is located and set to isolate the lower part of the wellbore.
bullnose	A blank end component substituting for a bit, when re entering an already existing hole to guide the BHA, to avoid inadvertent sidetracks, such as when run below a hole opener in an existing hole.
bull plug	A solid plug used as an isolation device in piping systems, conduits or wellbore tubulars.
sub-bumper	A spring loaded component used to minimize variations in weight transfer to the drill bit.
casing	Tubing used to line the wellbore and protect against pressure differences between the wellbore fluids and the formation.
casing cutter	Tool used for cutting through casing.
hanger casing subsea	Component used to hang a casing string from the well head at the sea bed.
hanger casing surface	Component used to hang casing from a surface location on land or a fixed platform.
casing head	The adapter between the first casing string and either the BOP stack (during drilling) or the wellhead (after completion).
catch assembly	
sub-catcher	
sub-circulation	Component used to allow venting part of the drilling fluids into the annulus rather than through the bit.
coiled tubing in hole	Section of coiled tubing that is inside the wellbore.
coiled tubing on coil	Section of coiled tubing that is on the coil.
drill pipe compressive	Strengthened drill pipe.
sub-cone	
core barrel	Tool used with a coring bit to retrieve geological core samples.
core orientation barrel	Core barrel used to sample geological cores at a know orientation.
sub-crossover	Sub used to convert from one thread type or size to another.
casing crossover	Component used to convert between casing threads and/or sizes.
sub-dart	A sub that controls activation of tools by means of dropping a dart down the drillstring.
die collar	
die collar LH	Die collar with left-handed thread.
directional guidance system	A tool that permits control of the drilling direction.
drill collar	Heavy pipe without tool joints used to apply weight to the bit.
drill pipe	Pipe used to convey the drilling assembly to the bottom of the hole.
drill pipe LH	Left-handed thread drill pipe
drill stem test BHA	Bottom Hole Assembly for drill stem testing
drive pipe	Pipe that is driven into the ground or sea bed to start drilling a well.
dual catch assembly	
extension bowl overshot	A type of overshot tool used in fishing stuck pipe.
extension sub-overshot	A type of overshot tool used in fishing stuck pipe.

float collar	A short length of casing fitted with a check valve. Prevents fluids from flowing back up the tubular string.
float shoe	A tapered, often bullet-nosed device fitted with a check valve and typically found at the bottom of a casing string.
sub-float	A valve, plunger or flapper, run in a drill collar to prevent fluid flow and debris into the string while running in hole. Sometime ported with a small leak path to allow shut in drillpipe pressure readings.
flow head	
guide shoe	A tapered, often bullet-nosed piece of equipment often found on the bottom of a casing string. Helps to guide the casing down the center of the hole when a casing string is being run into the hole.
MWD hang off sub	Component used for hanging the Measurement While Drilling tool.
heavy weight drill pipe	A type of drillpipe whose walls are thicker and collars are longer than conventional drillpipe.
heavy weight drill pipe LH	Left-handed thread heavy weight drill pipe.
riser high pressure	Marine riser used for deep water or high pressure applications
bit hole opener	Drill bit used for enlarging the hole.
casing inflatable packer	Expandable device used for packing off or isolating a section of wellbore used for performing well pressure tests.
motor instrumented	Downhole mud motor that can also take measurements of downhole drilling parameters.
jar	Hydraulic or spring-loaded component used to free stuck pipe.
sub-jetting	
junk basket	Component used to collect debris from the bottom of the hole.
junk basket reverse circulation	Component used to collect debris from the bottom of the hole when reverse circulating
sub-junk	Component used to collect debris from the bottom of the hole.
kelly	Hexagonal or square pipe used to rotate the drill string from the rig floor.
keyseat wiper tool	Tool used to open out narrow sections of open hole caused by pipe friction in tight radius bends.
landing float collar	A component installed near the bottom of the casing string on which the cement plugs land during the primary cementing operation.
lead impression block	Tool run on pipe or wireline to engage the top of a fish, and enable the condition of the exposed end of the fish to be ascertained from the pattern in soft lead in the tool.
liner	Casing or tubing that is hung from the inside of existing casing rather than from the sea bed or surface.
hanger liner	Component that is used to hang liner from inside casing.
magnet	Magnet used to retrieve magnetic debris from the hole.
riser marine	Large diameter pipe that connects from the sea bed to an offshore rig.
mill dress	Milling tool used to dress or clean up pipe that is to be retrieved from the hole.
mill flat bottom	Flat bottomed milling tool, used to tidy up the broken end of pipe stuck in the hole prior to fishing.
mill hollow	Hollow milling tool
mill polish	
mill section	
mill taper	Tapered milling tool.
mill washover	Large diameter milling tool that goes over the end of stuck pipe.
mill packer picker assembly	
millout extension	
multilateral hanger running tool	Tool used to hang casing in multi-lateral wellbores.
hanger mud line	
motor	Downhole tool, usually powered by fluid flow, that rotates the drill bit.
mule shoe	
logging while drilling tool	Tool that can take downhole measurements of formation properties and wellbore direction while drilling.
stabilizer near bit roller reamer	Stabilizer that is placed close to the bit
stabilizer near bit	Stabilizer placed near the bit to provide directional control.
stabilizer non-rotating	Stabilizer that does not rotate with the drill string.

sub-orienting	Sub used to orient the drill string for directionla drilling.
other	
overshot	Tool used for retrieving pipe that has been lost in the hole.
overshot LH	Left-handed overshot tool.
oversize lip guide overshot	Specific type of overshot tool used for fishing.
packer	Component that can be inflated so that it seals off a section of the wellbore, typically for formation testing.
polished bore receptacle	
mill pilot	Milling tool used in fishing stuck pipe.
pipe cutter	Tool for cutting through pipe that has become stuck in the hole.
ported stinger	
sub-ported	Component with a port or vent tha allows mud to be circulated into the annulus.
prepacked screens	A type of screen used in sand control applications to support the gravel pack.
sub-pressure relief	Component used to relieve wellbore pressures.
riser production	Riser pipe used to carry produced fluids.
MWD pulser	Measurement While Drilling component that send encodes downhole data into hydraulic pulses that can be detected and decoded at the surface.
sub-pump out	
sub-restrictor	Component that provides a restriction to mud flow to control hydraulics.
packer retrieve TT squeeze	Torque Transmission
reversing tool	A downhole tool that is designed to enable communication between the tubing internal diameter and the annulus, typically for reverse-circulation purposes
stabilizer string roller reamer	A stabilizer that has rotating rollers rather than fixed blades to reduce friction with the sides of the hole.
packer RTTS	Retrievable packer, designed for testing, treating, and squeezing.
running tool	
safety joint	A weak spot in the drillstring so that if tension in the drillstring exceeds a predetermined amount, the safety joint will part and the rest of the drillstring will be salvageable.
safety joint LH	Left-handed threaded safety joint providing a weak spot in the drillstring so that if tension in the drillstring exceeds a predetermined amount, the safety joint will part and the rest of the drillstring will be salvageable.
sub-saver	Component used to reduce wear on the threads of components such as drill bits that are often re-used.
scab liner bit guide	
scraper	
scratchers	A device for cleaning mud and mud filter cake off of the wellbore wall when cementing casing in the hole to ensure good contact and bonding between the cement and the wellbore wall.
casing shoe screw-in	Screw-in casing shoe.
sub-shock	
drill collar short	Short drill collar used to adjust the length and spacing of BHA components.
sub-side entry	
slotted liner	Liner casing that has slots to allow passage of produced fluids.
spear	Fishing tool that attaches to the inside of the stuck pipe by threads or grapples.
stage cement collar	
motor steerable	Downhole motor, usually powered by mud flow, that can be steered.
packer storm valve RTTS	Retrievable packer, designed for testing, treating, and squeezing.
stabilizer string	
surface pipe	Pipework that connects the top of the drillstring to the mud pumps.
taper tap	Tool used to tap a thread into components that are stuck in the hole.
taper tap LH	Left-handed thread tapping tool.
tubing-conveyed perforating gun	Perforating gun that is deployed on the end of a tubular string rather than a wireline
thruster	Drilling tool used to maintain weight on bit.
tieback polished bore receptacle	

tieback stinger	Tool used to position a tie-back string of tubing connecting a liner to the surface.
tubing	Small diameter pipe that is run inside casing or tubing as part of the well completion.
hanger tubing	Component used to hang tubing inside casing or liner.
turbine	Downhole device used for directional drilling, powered by mud circulation that rotates the drill bit while the drill string remains non-rotating
bit under reamer	Component that is run behind the bit and opens out the hole to a larger diameter.
stabilizer variable blade	Stabilizer with blades that can be adjusted to varying diameters.
washover pipe	Large diameter pipe with an internal grapple used for retrieving stuch pipe.
mill watermelon	Milling tool shaped like a watermelon.
whipstock	Wedge shaped tool used to drill off in a different direction.
whipstock anchor	Anchor device used to position whipstock.
stabilizer turbo back	
stabilizer inline	
stabilizer steerable	Stabilizer with adjustable blades to allow steering the drilling direction.
sub-stop	
sub-filter	
mill casing cutting	Milling tool used for cutting through casing.
reamer	Tool used to enlarge the hole.