SPE-199644-MS New Version of IADC Daily Drilling Report Increases Granularity, Provides Opportunity to Automate & Collaborate Using a Common Digital Format

David Shackleton, Independent Data Services; Robert van Kuilenburg, Noble Corporation; Nathan Moralez, BP America Inc.; Robin Macmillan, National Oilwell Varco; John de Wardt, De Ward & Company; Linda Hsieh, IADC

Outline

- What is the IADC DDR, and what is it used for?
- Why did it need updating?
- What was the process?
- Two main demands from IADC Members
- How were these demands fulfilled?
- How is the DDR Plus being used now?
- What is the future?

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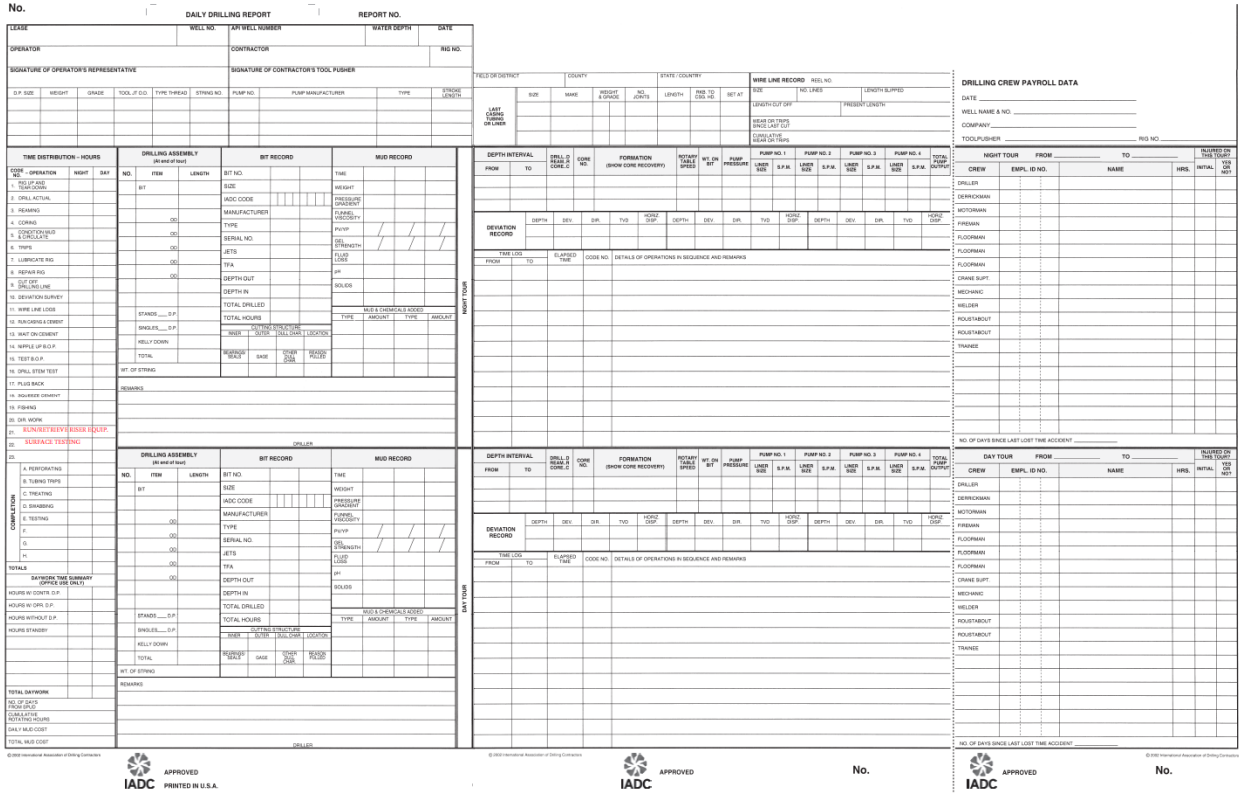
David Shackleton, Independent Data Services

What is the IADC DDR?



- Used on most drilling rigs
- Record of:
  - Daily rig activity
  - Crew for payroll
  - Equipment – surface & downhole
  - Well & Wellbore
  - Bit, BHA, muds, etc.

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Why did the IADC DDR Need Updating?

- Had not been meaningfully updated in decades
- Opportunities lost to integrate the report in to the modern well construction process

What was the first step?

- Industry survey with over 100 responses.
  - How is the DDR being used?
  - What needs improving?

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Who Responded?

	No. Responses	Unique Companies
Drilling Contractors	78	29
Operators	21	17
Service companies	16	12
OEM	4	4
Data Acquisition Companies	3	3
Other	11	11

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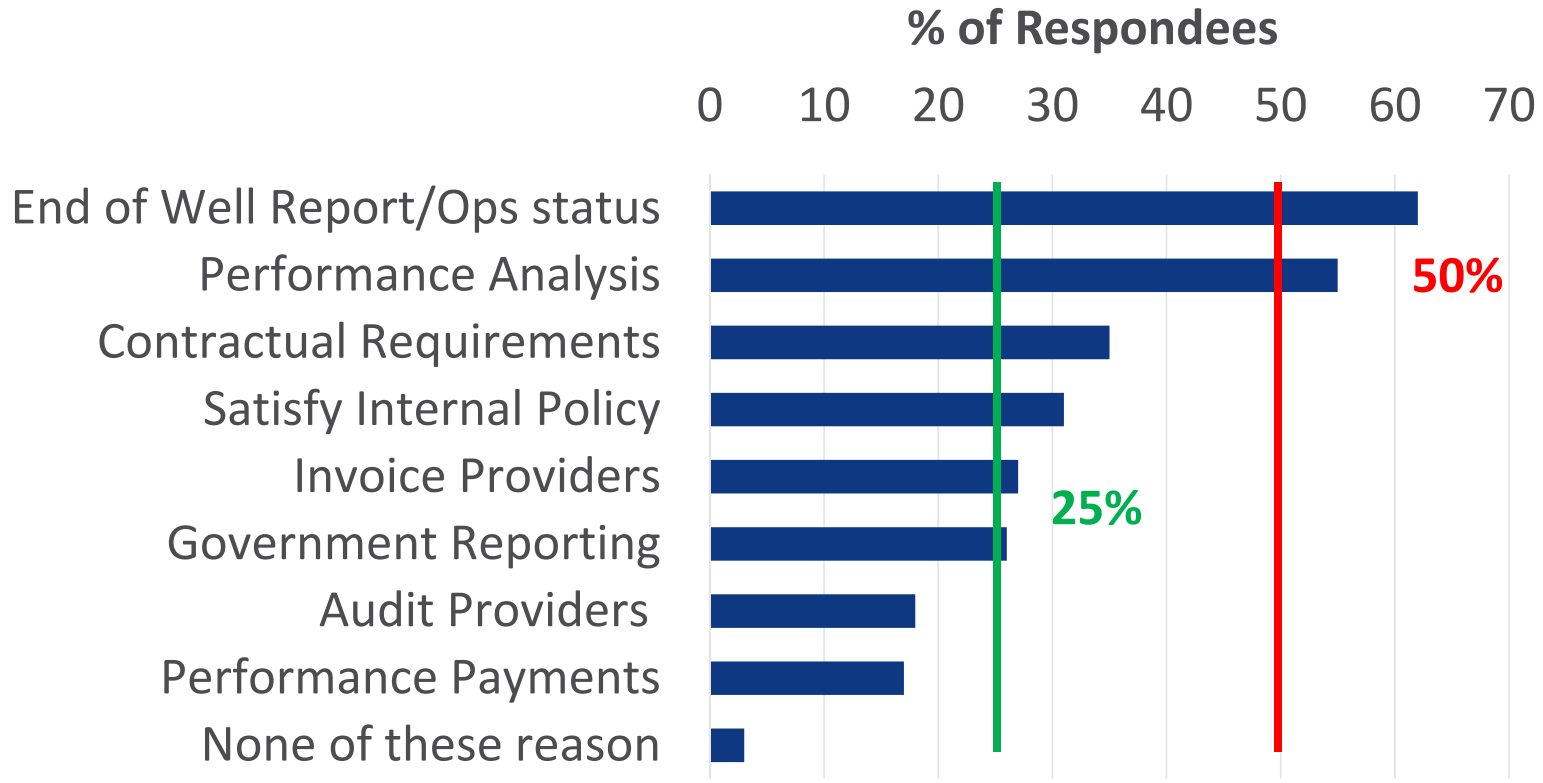
Q1. How do you use the IADC DDR form?



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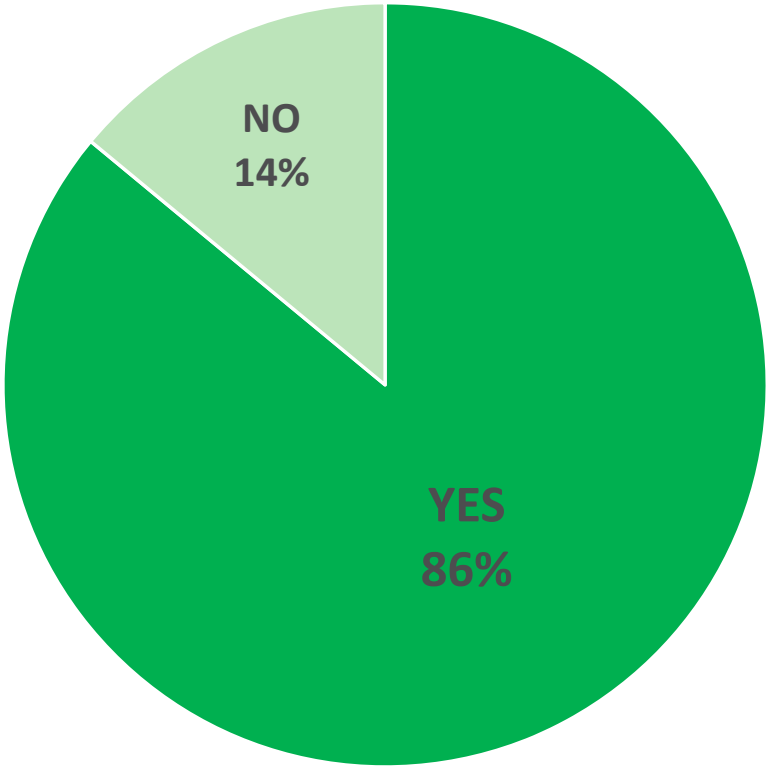
Q 11. Standard way to import data, automated reporting?



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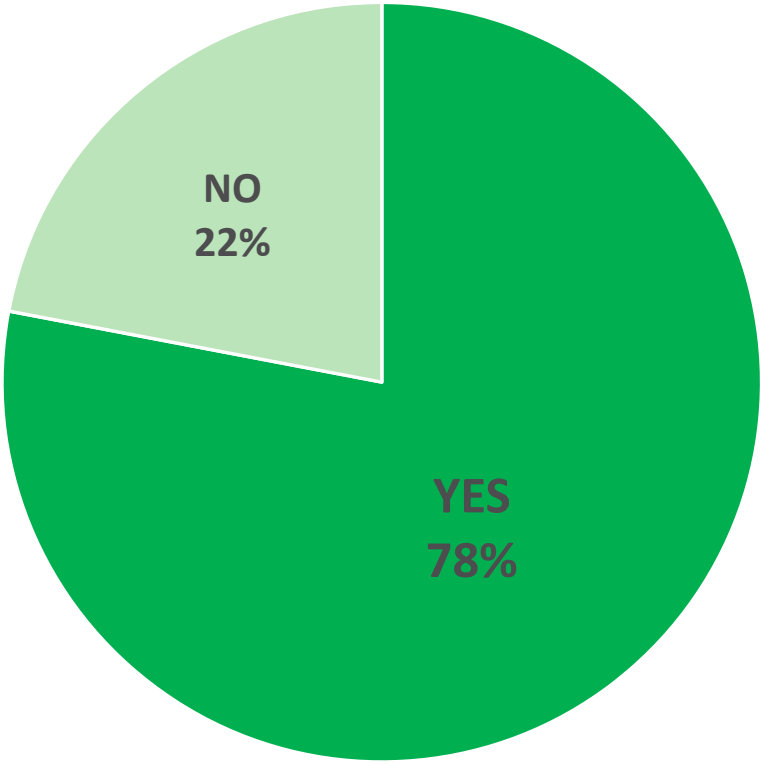
Q 12. 'Rig State Engines' to complete automatically?



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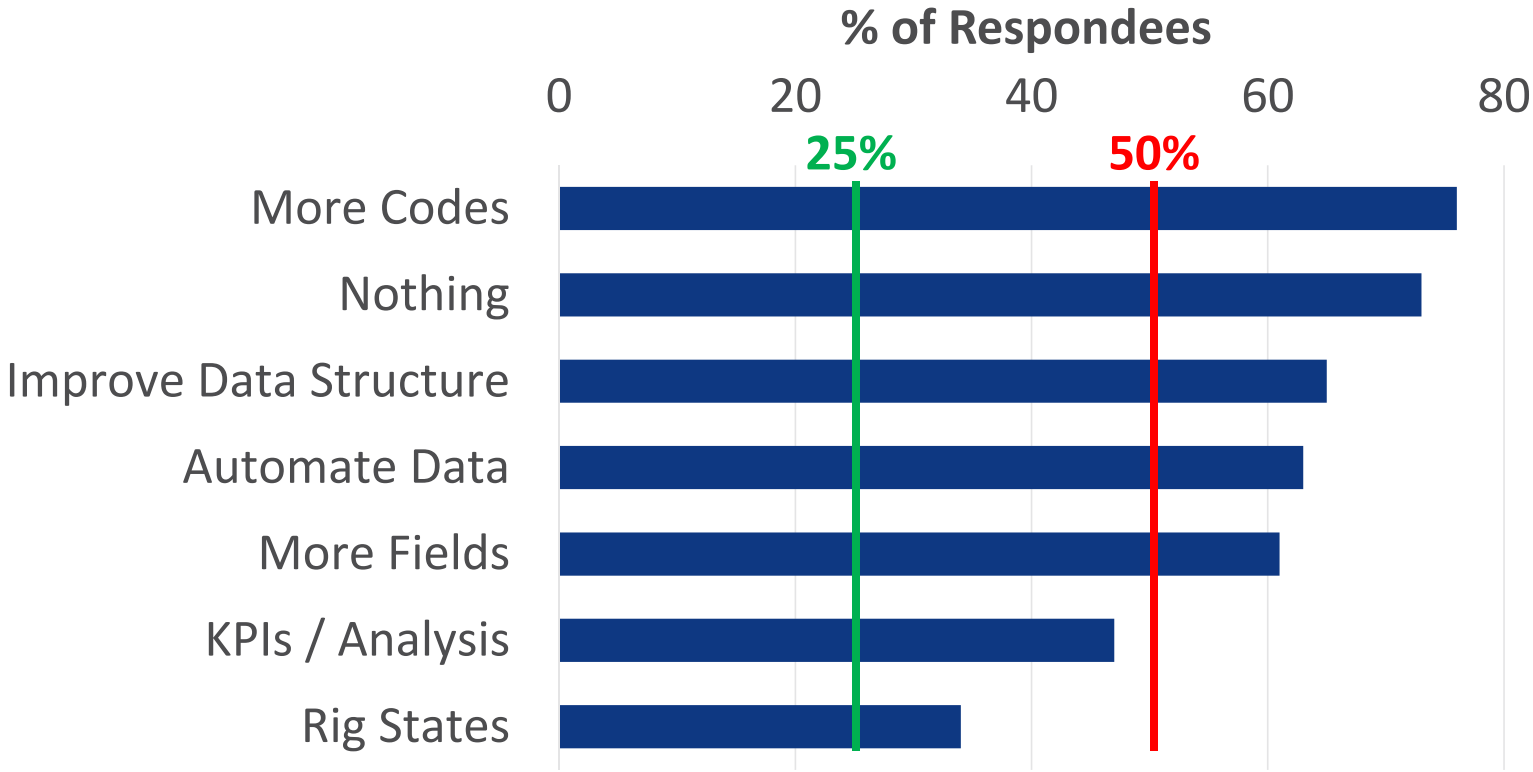
Q 15a. What needs to be changed for your company?



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Change with the Times

Digitalize and Automate

- Easy data flow in and out
- Automatic data input using **rig states**

Update Codes

- More codes
- Update Activity descriptions
- Add sub-codes

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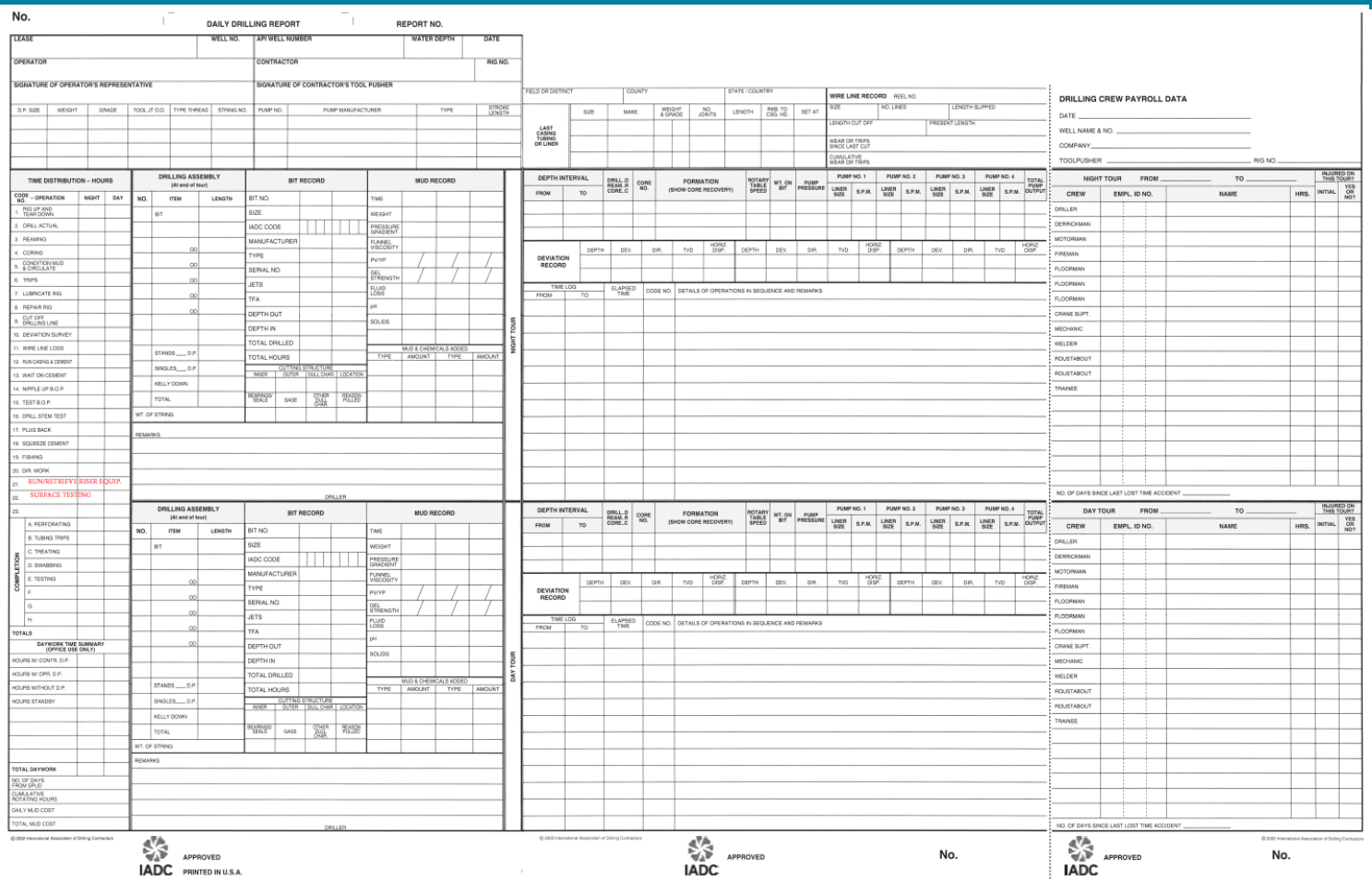

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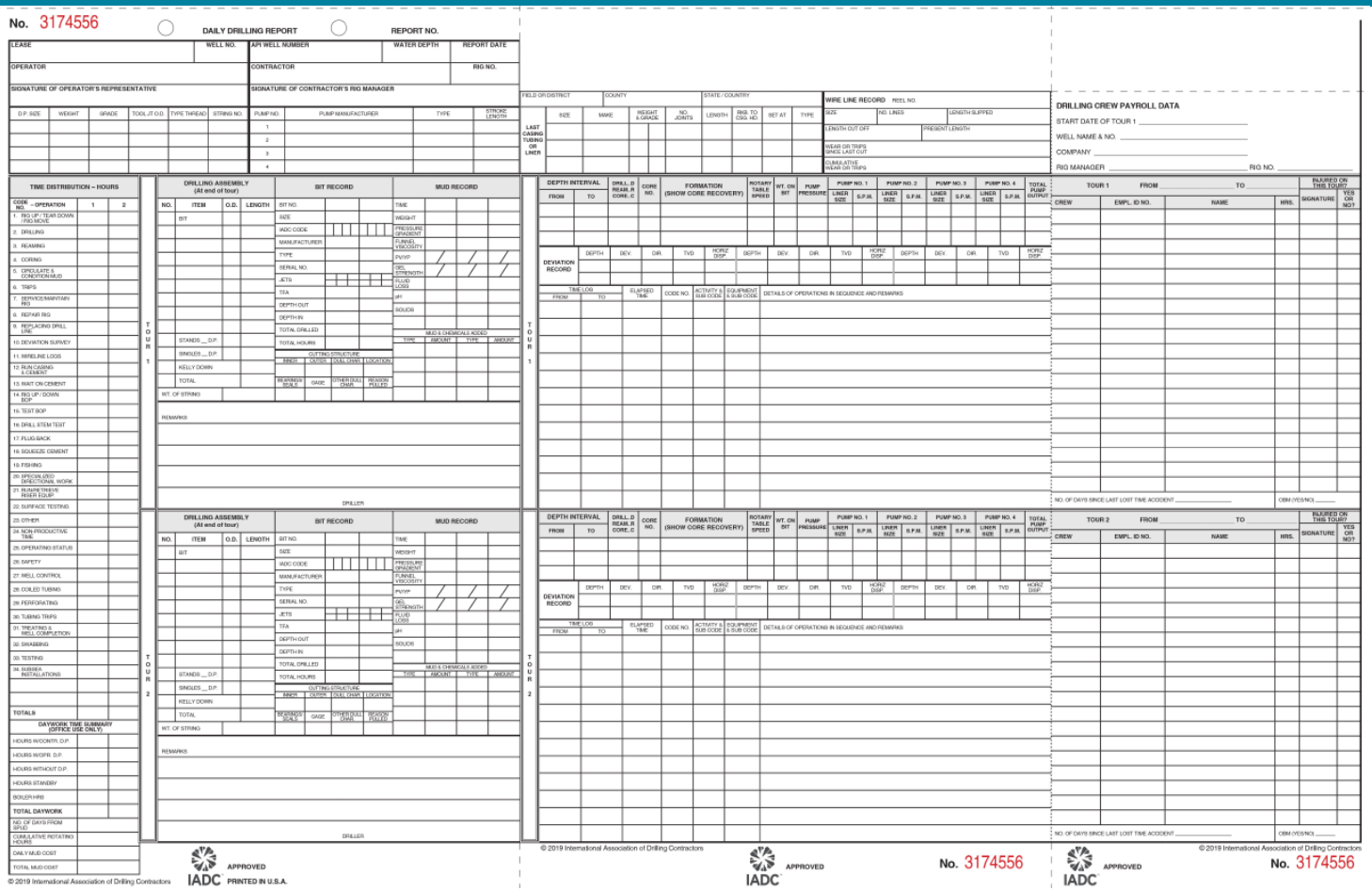

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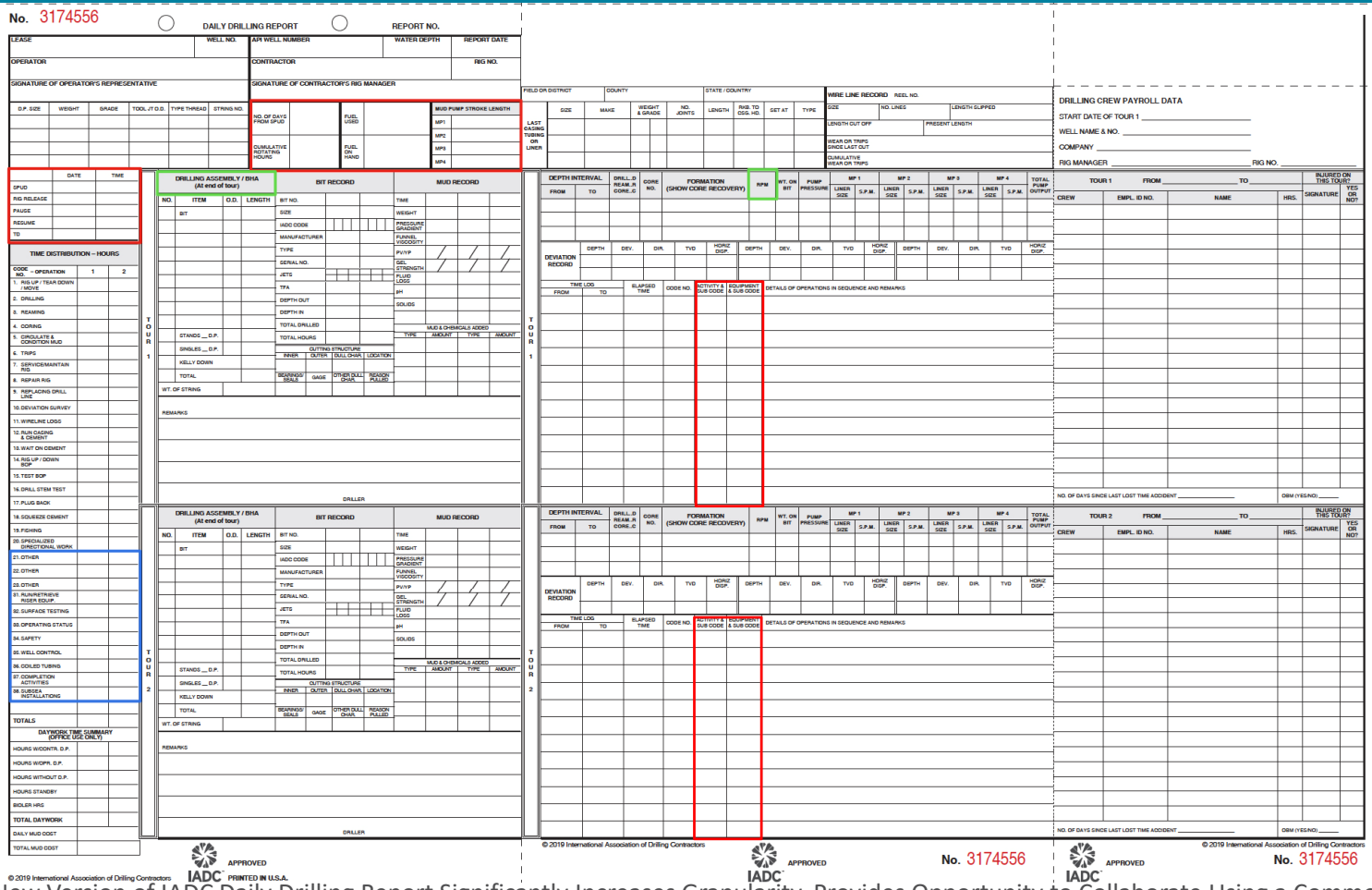
No. 3174556

DAILY DRILLING REPORT

REPORT NO.

LEASE | WELL NO. | API WELL NUMBER | WATER DEPTH | REPORT DATE

OPERATOR | CONTRACTOR | RIG NO.

SIGNATURE OF OPERATOR'S REPRESENTATIVE | SIGNATURE OF CONTRACTOR'S RIG MANAGER

D.P. SIZE | WEIGHT | GRADE | TOOL JT O.D. | TYPE THREAD | STRING NO.

NO. OF DAYS FROM SPUD | FUEL USED | MUD PUMP STROKE LENGTH (MP1, MP2, MP3, MP4)

DUMULATIVE ROTATING HOURS | FUEL ON HAND

FIELD OR DISTRICT | COUNTY | STATE / COUNTRY

LAST CASING TUBING OR LINER: SIZE | MAKE | WEIGHT & GRADE | NO. JOINTS | LENGTH | RKB. TO CSG. HD. | SET AT | TYPE

WIRE LINE RECORD REEL NO.: SIZE | NO. LINES | LENGTH SLIPPED | LENGTH CUT OFF | PRESENT LENGTH | WEAR ON TRIPS SINCE LAST CUT | CUMULATIVE WEAR ON TRIPS

DRILLING CREW PAYROLL DATA
START DATE OF TOUR 1
WELL NAME & NO.
COMPANY
RIG MANAGER | RIG NO.

	DATE	TIME
SPUD		
RIG RELEASE		
PAUSE		
RESUME		
TD		

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		
81.	RUN/RETRIEVE RISER EQUIP.		
82.	SURFACE TESTING		
89.	OPERATING STATUS		
34.	SAFETY		
35.	WELL CONTROL		
36.	COILED TUBING		
37.	COMPLETION ACTIVITIES		
38.	SUBSEA INSTALLATIONS		
	TOTALS		

DAYWORK TIME SUMMARY (OFFICE USE ONLY)

HOURS W/CONTR. D.P.
HOURS W/OPR. D.P.
HOURS WITHOUT D.P.
HOURS STANDBY
BOILER HRS
TOTAL DAYWORK
DAILY MUD COST
TOTAL MUD COST

TOUR 1 / TOUR 2

DRILLING ASSEMBLY / BHA (At end of tour): NO. | ITEM | O.D. | LENGTH
BIT
STANDS __ D.P.
SINGLES __ D.P.
KELLY DOWN
TOTAL
WT. OF STRING

BIT RECORD: BIT NO. | SIZE | IADC CODE | MANUFACTURER | TYPE | SERIAL NO. | JETS | TFA | DEPTH OUT | DEPTH IN | TOTAL DRILLED | TOTAL HOURS
CUTTING STRUCTURE: INNER | OUTER | DULL CHAR. | LOCATION | BEARINGS/ SEALS | GAGE | OTHER DULL CHAR. | REASON PULLED

MUD RECORD: TIME | WEIGHT | PRESSURE GRADIENT | FUNNEL VISCOSITY | PV/YP | GEL STRENGTH | FLUID LOSS | pH | SOLIDS
MUD & CHEMICALS ADDED: TYPE | AMOUNT | TYPE | AMOUNT

REMARKS

DRILLER

DEPTH INTERVAL: FROM | TO | DRILL. / REAM. / CORE. | CORE NO. | FORMATION (SHOW CORE RECOVERY) | RPM | WT. ON BIT | PUMP PRESSURE | MP 1 | MP 2 | MP 3 | MP 4 | TOTAL PUMP OUTPUT
(LINER SIZE | S.P.M.)

DEVIATION RECORD: DEPTH | DEV. | DIR. | TVD | HORIZ DISP.

TIME LOG: FROM | TO | ELAPSED TIME | CODE NO. | ACTIVITY & SUB CODE | EQUIPMENT & SUB CODE | DETAILS OF OPERATIONS IN SEQUENCE AND REMARKS

TOUR 1 | FROM | TO

CREW	EMPL. ID NO.	NAME	HRS.	SIGNATURE	INJURED ON THIS TOUR? YES OR NO?

NO. OF DAYS SINCE LAST LOST TIME ACCIDENT
DRM (YES/NO):

TOUR 2 | FROM | TO

CREW	EMPL. ID NO.	NAME	HRS.	SIGNATURE	INJURED ON THIS TOUR? YES OR NO?

NO. OF DAYS SINCE LAST LOST TIME ACCIDENT
DRM (YES/NO):

IADC APPROVED
PRINTED IN U.S.A.
No. 3174556

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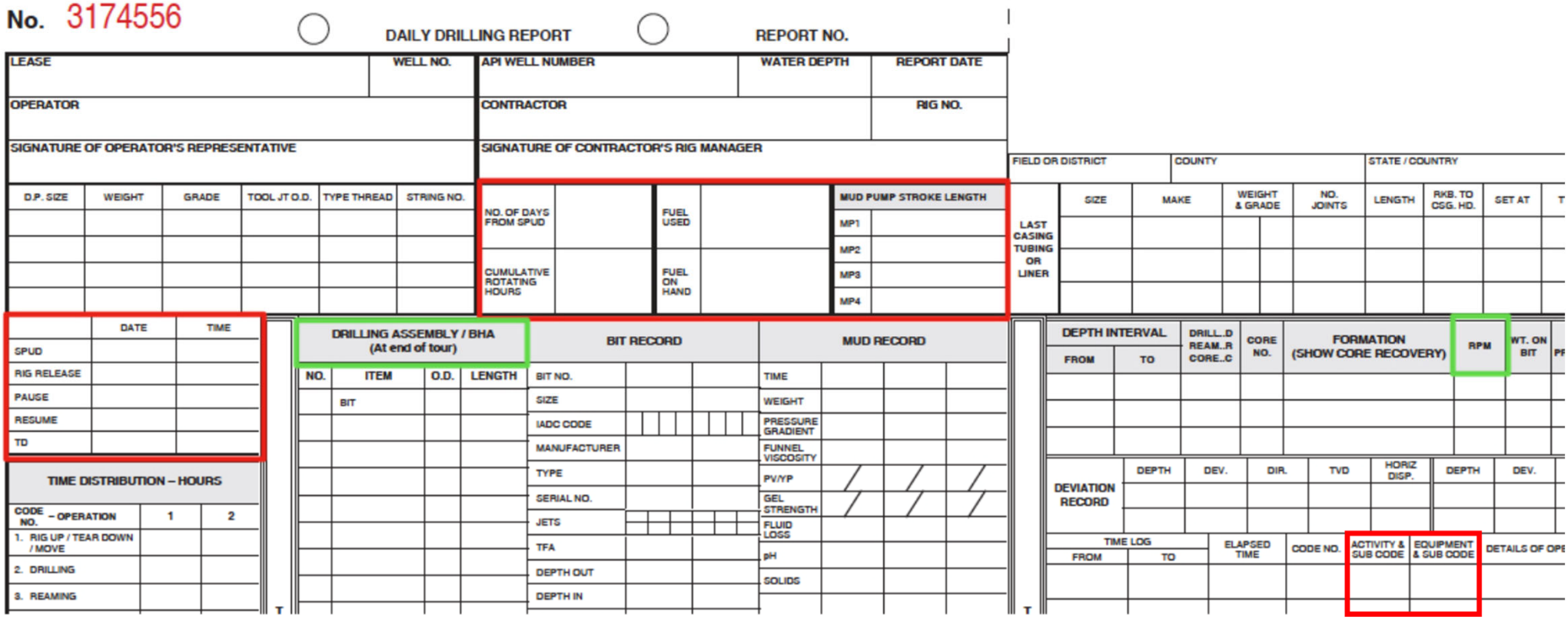
David Shackleton, Independent Data Services

The New DDR Plus – updates to paper format



No. 3174556

DAILY DRILLING REPORT

REPORT NO.

LEASE	WELL NO.	API WELL NUMBER	WATER DEPTH	REPORT DATE
OPERATOR		CONTRACTOR		RIG NO.
SIGNATURE OF OPERATOR'S REPRESENTATIVE		SIGNATURE OF CONTRACTOR'S RIG MANAGER		

D.P. SIZE	WEIGHT	GRADE	TOOL JT O.D.	TYPE THREAD	STRING NO.

NO. OF DAYS FROM SPUD		FUEL USED		MUD PUMP STROKE LENGTH	
CUMULATIVE ROTATING HOURS		FUEL ON HAND		MP1	
				MP2	
				MP3	
				MP4	

	DATE	TIME
SPUD		
RIG RELEASE		
PAUSE		
RESUME		
TD		

TIME DISTRIBUTION – HOURS		
CODE NO. – OPERATION	1	2
1. RIG UP / TEAR DOWN / MOVE		
2. DRILLING		
3. REAMING		

DRILLING ASSEMBLY / BHA (At end of tour)			
NO.	ITEM	O.D.	LENGTH
	BIT		

BIT RECORD			
BIT NO.			
SIZE			
IADC CODE			
MANUFACTURER			
TYPE			
SERIAL NO.			
JETS			
TFA			
DEPTH OUT			
DEPTH IN			

MUD RECORD			
TIME			
WEIGHT			
PRESSURE GRADIENT			
FUNNEL VISCOSITY			
PV/YP			
GEL STRENGTH			
FLUID LOSS			
pH			
SOLIDS			

FIELD OR DISTRICT	COUNTY	STATE / COUNTRY

LAST CASING TUBING OR LINER	SIZE	MAKE	WEIGHT & GRADE	NO. JOINTS	LENGTH	RKB. TO CSG. HD.	SET AT	T

DEPTH INTERVAL		DRILL..D REAM..R CORE..C	CORE NO.	FORMATION (SHOW CORE RECOVERY)	RPM	WT. ON BIT	PF
FROM	TO						

DEVIATION RECORD	DEPTH	DEV.	DIR.	TVD	HORIZ DISP.	DEPTH	DEV.

TIME LOG		ELAPSED TIME	CODE NO.	ACTIVITY & SUB CODE	EQUIPMENT & SUB CODE	DETAILS OF OPE
FROM	TO					

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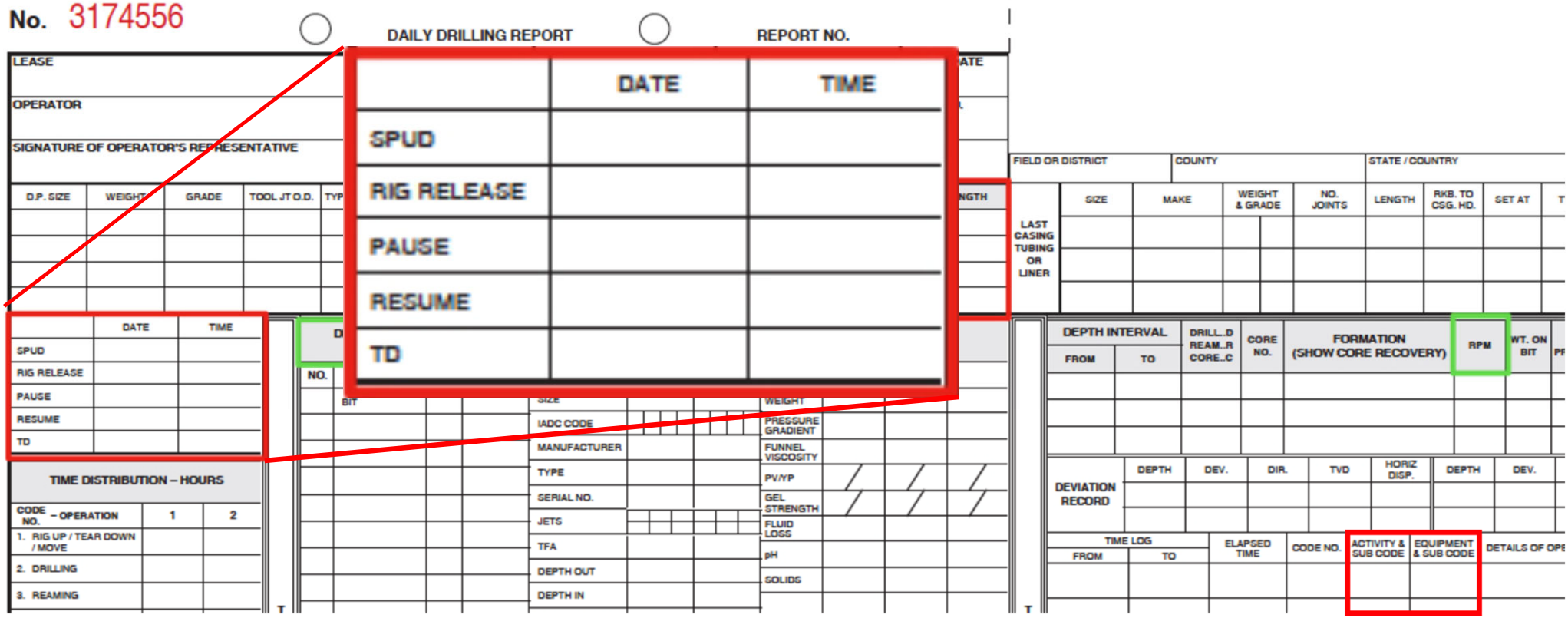

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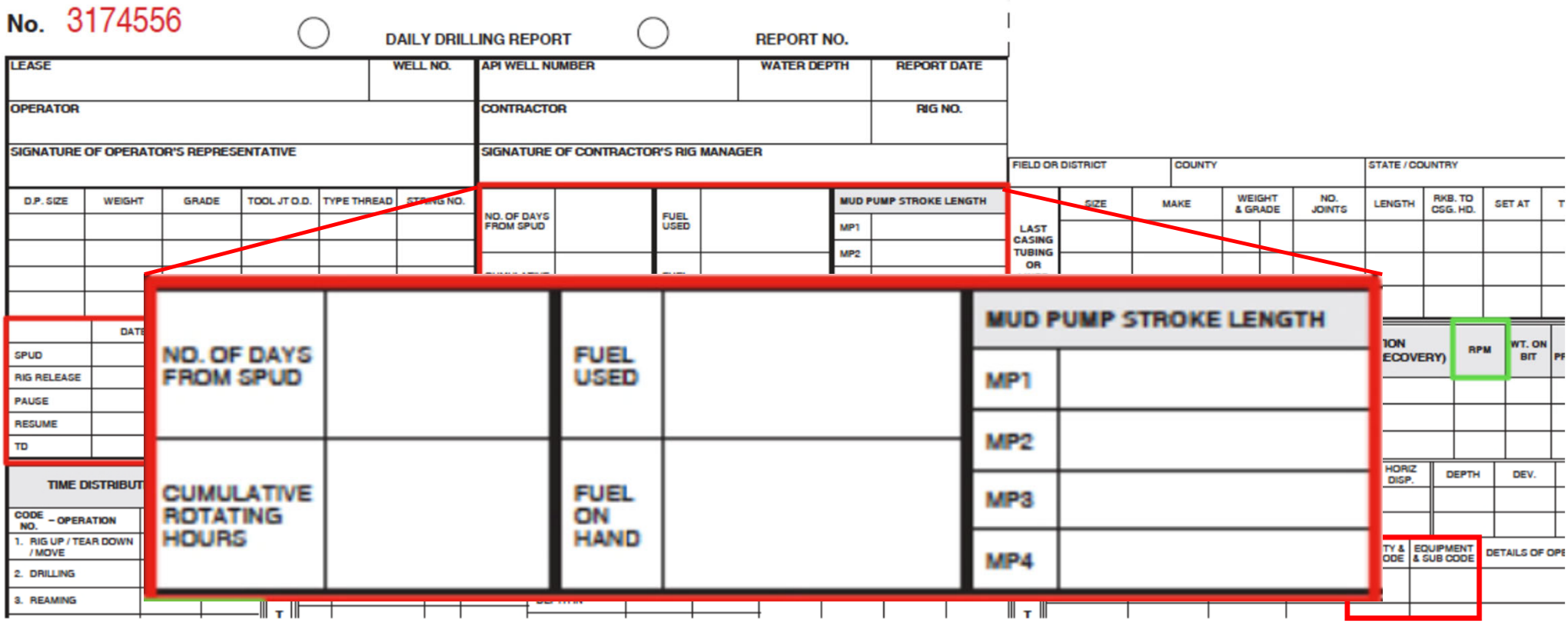

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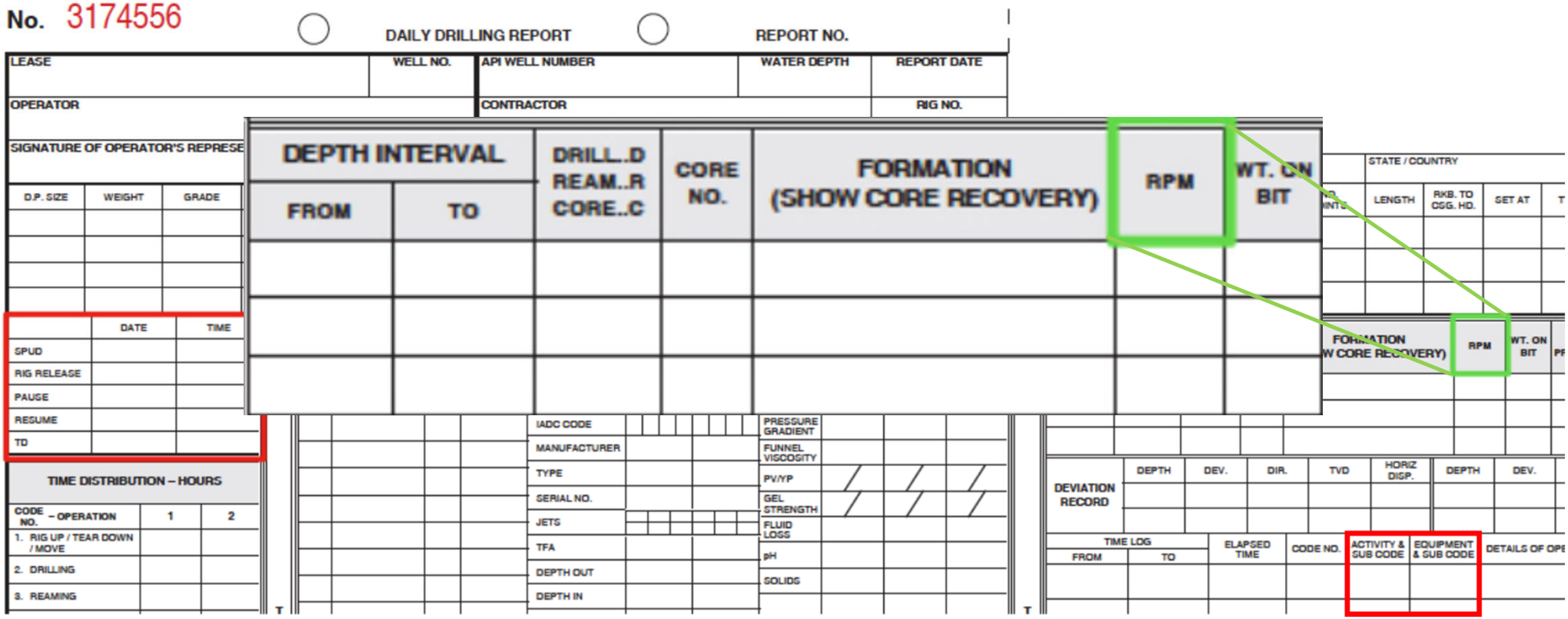

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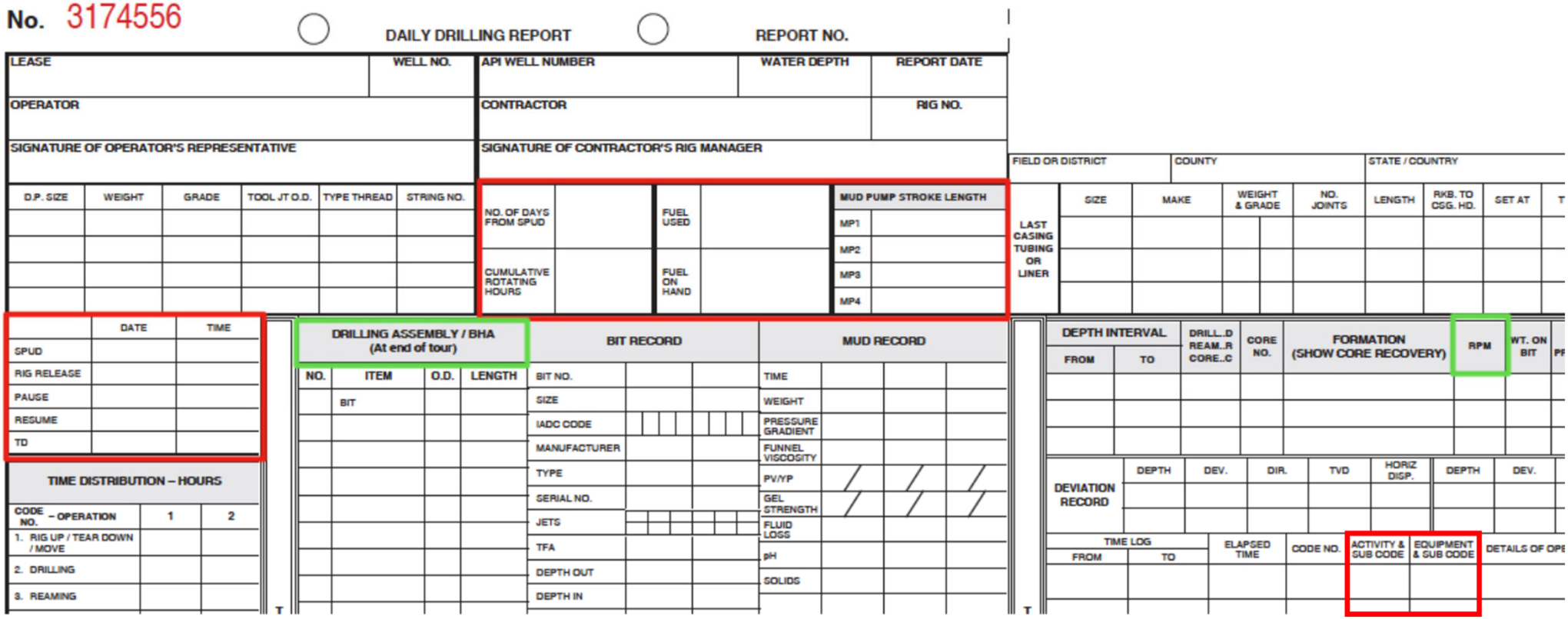

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REPORT NO.

LEASE	WELL NO.	API WELL NUMBER	WATER DEPTH	REPORT DATE
OPERATOR		CONTRACTOR		RIG NO.
SIGNATURE OF OPERATOR'S REPRESENTATIVE		SIGNATURE OF CONTRACTOR'S RIG MANAGER		

D.P. SIZE	WEIGHT	GRADE	TOOL JT O.D.	TYPE THREAD	STRING NO.

NO. OF DAYS FROM SPUD		FUEL USED		MUD PUMP STROKE LENGTH	
CUMULATIVE ROTATING HOURS		FUEL ON HAND		MP1	
				MP2	
				MP3	
				MP4	

	DATE	TIME
SPUD		
RIG RELEASE		
PAUSE		
RESUME		
TD		

TIME DISTRIBUTION – HOURS		
CODE NO. – OPERATION	1	2
1. RIG UP / TEAR DOWN / MOVE		
2. DRILLING		
3. REAMING		

DRILLING ASSEMBLY / BHA (At end of tour)			
NO.	ITEM	O.D.	LENGTH
	BIT		

BIT RECORD			
BIT NO.			
SIZE			
IADC CODE			
MANUFACTURER			
TYPE			
SERIAL NO.			
JETS			
TFA			
DEPTH OUT			
DEPTH IN			

MUD RECORD			
TIME			
WEIGHT			
PRESSURE GRADIENT			
FUNNEL VISCOSITY			
PV/YP			
GEL STRENGTH			
FLUID LOSS			
pH			
SOLIDS			

FIELD OR DISTRICT	COUNTY	STATE / COUNTRY

LAST CASING TUBING OR LINER	SIZE	MAKE	WEIGHT & GRADE	NO. JOINTS	LENGTH	RKB. TO CSG. HD.	SET AT	T

DEPTH INTERVAL		DRILL..D REAM..R CORE..C	CORE NO.	FORMATION (SHOW CORE RECOVERY)	RPM	WT. ON BIT	PF
FROM	TO						

DEVIATION RECORD	DEPTH	DEV.	DIR.	TVD	HORIZ DISP.	DEPTH	DEV.

TIME LOG		ELAPSED TIME	CODE NO.	ACTIVITY & SUB CODE	EQUIPMENT & SUB CODE	DETAILS OF OPE
FROM	TO					

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The New DDR Plus - Main Codes

OLD	NEW DDR Plus
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 & CIRCULATE	5 CIRCULATE & CONDITION MUD
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

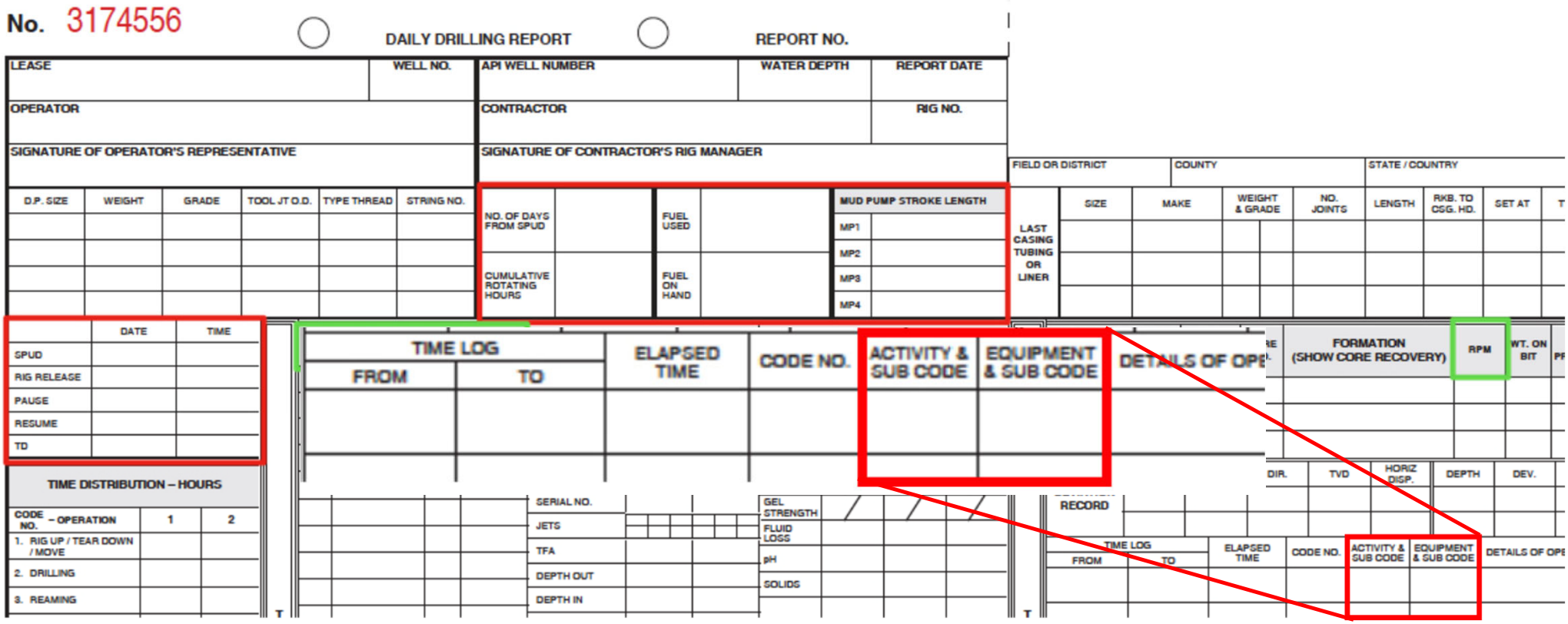
The New DDR Plus - Main Codes

OLD	NEW DDR Plus
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 WORK
21 RUN/RETRIEVE RISER EQUIP.	21 [UNDEFINED - INTERNAL USE ONLY]
22 SURFACE TESTING	22 [UNDEFINED - INTERNAL USE ONLY]
23 OTHER	23 [UNDEFINED - INTERNAL USE ONLY]
[unused]	24 [UNDEFINED - INTERNAL USE ONLY]

The New DDR Plus - Main Codes

OLD	NEW DDR Plus
[unused]	30 [UNDEFINED - INTERNAL USE ONLY]
[unused]	31 RUN/RETRIEVE RISER EQUIP.
[unused]	32 SURFACE TESTING
[unused]	33 OPERATING STATUS
[unused]	34 SAFETY
[unused]	35 WELL CONTROL
[unused]	36 COILED TUBING
A PERFORATING	37 COMPLETION ACTIVITIES
B TUBING TRIPS	37 COMPLETION ACTIVITIES
C TREATING	37 COMPLETION ACTIVITIES
D SWABBING	37 COMPLETION ACTIVITIES
E TESTING	37 COMPLETION ACTIVITIES
[unused]	38 SUBSEA INSTALATIONS
[unused]	39 RESERVED FOR FUTURE IADC USE

The New DDR Plus – updates to paper format



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The New DDR Plus - Granular Code-set

Aim: To fully describe Drilling and Completion operations

- Operation (28 codes)
  - Activity (169)
    - Sub-activity (40)
  - Equipment (120)
    - Sub-equipment (75)

E.g.,

- *DRILLING*
  - *Ahead*
    - *Rotating*
  - *Land Drilling Rig*
    - *Drill Pipe*

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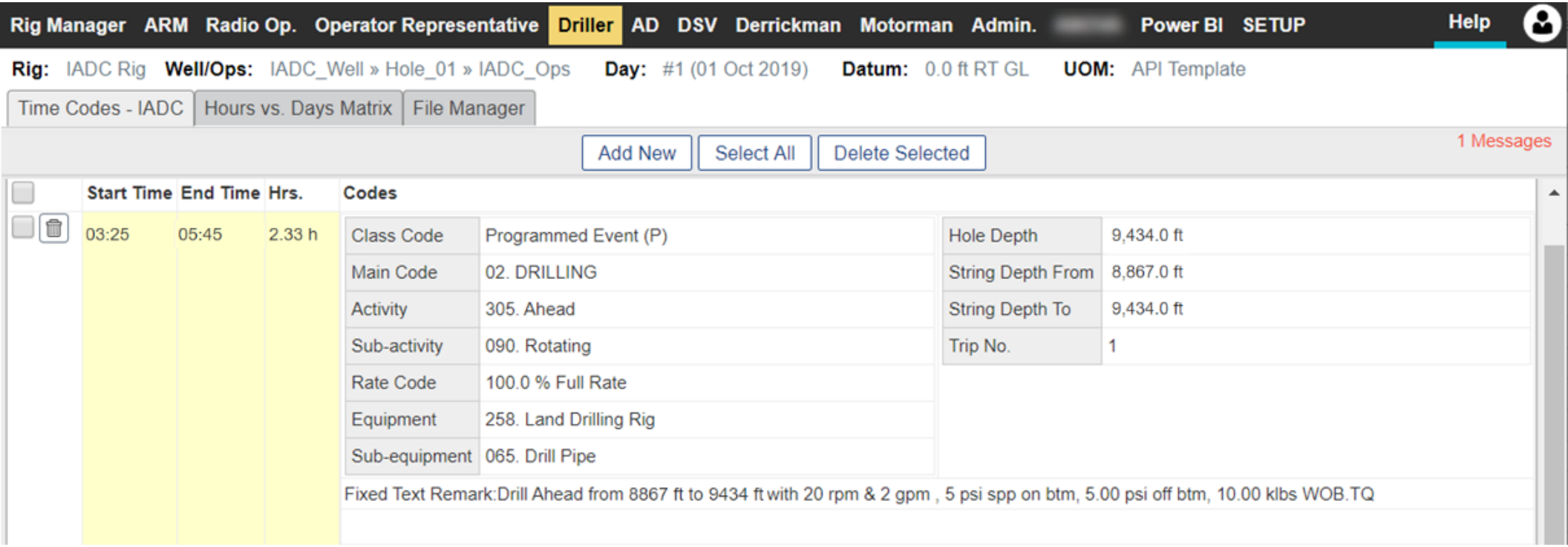
The New DDR Plus - Granular Code-set – Automated



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The New DDR Plus - Common Digital Description

Leaning heavily on established

Well-Site Information Transfer Standard Markup Language

(WITSML) XML Schema

Paper report with digital copy → truly, fundamentally digital report

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The New DDR Plus - Common Digital Description

WITSML 1.4

- attachment
- bhaRun
- cementJob
- changeLog
- convCore
- coordinateRefSystem
- drillReport
- fluidsReport
- formationMarker
- log
- message
- mudLog
- objectGroup
- opsReport
- rig
- risk
- sidewallCore
- stimJob
- surveyProgram
- target
- toolErrorModel
- toolErrorTermSet
- trajectory
- tubular
- wbGeometry
- well
- wellbore

iadcDdrPlus

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The New DDR Plus - Common Digital Description

```
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    <nameWell>Test Well M</nameWell>
    <nameWellbore>Test Wellbore M</nameWellbore>
    <name>1</name>
    <rig uidRef="RigUid00-1">Test Rig</rig>
    <dTim>1970-01-01T00:00:00.000Z</dTim>
    <refLease>Leasing Details</refLease>
    <operatorCompany>Operator Company XYZ</operatorCompany>
    <operatorPersonnel>Jane Doe</operatorPersonnel>
    <operatorSigned>1</operatorSigned>
    <contractorCompany>ABC</contractorCompany>
    <contractorPersonnel>John Doe</contractorPersonnel>
```

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Current Development Status

- v1.0 introduced early 2019
- Power users provided significant feedback
- Feedback incorporated into v2.0 released December 2019
- As v2.0 is adopted, new optimized versions will be released.
- Eye on the future of full automation

SPE-199664-MS 'New Version of IADC Daily Drilling Report Significantly Increases Granularity, Provides Opportunity to Collaborate Using a Common Digital Format'
David Shackleton, Independent Data Services

Current Use Case

Rig Systems
- Real-time data
- Service co. data
  BHAs, muds, etc.

+ Rig State Detection

Automated Time Log / Activities

Manual entry

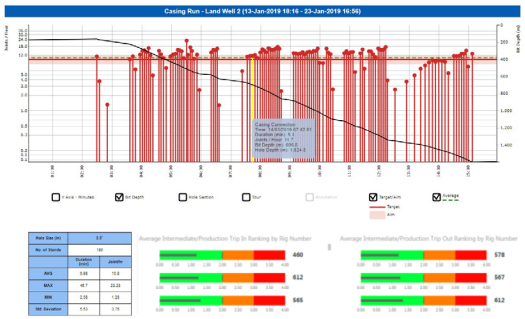
QC

Doc. parsing

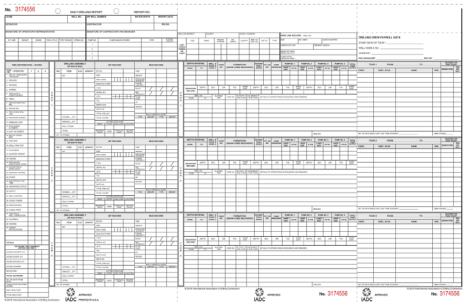
Data bridges

DDR Plus™ Schema

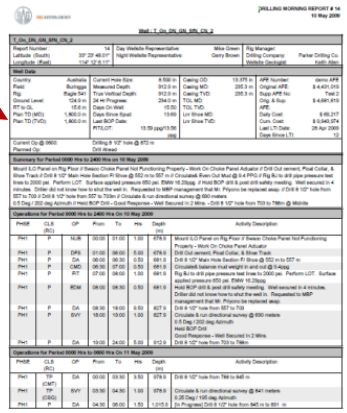
Performance Management



DDR Plus™



Office Systems
- ERP/databases
- pdf, spreadsheets



Operator DDR

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Value & Benefits of Common Digital Description

- Easy flow of data between & within organizations:
  - Service companies provide BHA, Tubular, Mud, etc. data in standard format
  - Data companies can provide standardized services for data collection & storage
  - Drilling Contractors can provide the data from their DDR Plus to analyze

- Standardized services can be developed for the DDR Plus

SPE-199664-MS 'New Version of IADC Daily Drilling Report Significantly Increases Granularity, Provides Opportunity to Collaborate Using a Common Digital Format'
David Shackleton, Independent Data Services

Summary

IADC DDR Plus

- Designed for modern drilling, completions & interventions
- Industry-driven, designed, developed & delivered
- Granular code-set ready for detailed reporting, analysis & automated rig state
- Standard digital format for easier collaboration & economy of scale for driving innovation

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David Shackleton, Independent Data Services

The New DDR Plus - Website

https://www.iadc.org/ddrplus/

Advanced Rig Technology (ART) subcommittee:
DATA, CONTROLS AND SENSORS (DCS)

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Thank you!

Questions?