Case Study #1

Nelgar's 'Wireless'
N.E.R.D. TM Dynamometer is the only system in the world that will collect enough data points to record spikes due to chipped gearbox teeth.
(See Graph on Page 3)

Golden Company
100/00-00-000-00 W0M/00
Surface: 00-00-000-00 W0M

Foreman's Report/Work Order

Work Ordered By: William Domore	Type of work: Dynamometer.
Date work completed: xxxx-11-13	Work completed by:
Reason for Dynamometer: Well knocking at beginning of upstroke.	Comments: Sharp load spike at beginning of upstroke. Good pump function (gross efficiency 85.6%). Rod string heavily loaded.

Work requested:

Reverse the unit rotation and inspect the gearbox for possible chipped tooth.
Monitor production, allow the well to stabilize and re-dyno to evaluate the conditions, equipment loading and counterbalance requirement.

Ensure that the well is connected to the 50 hp connection (possible savings of $1325.00 per month in electricity, prime mover rating: 50-60-75 hp). Horsepower requirements at present time are 43.5 hp.

The next time the well is serviced, to improve production, ensure the tubing anchor is holding properly. A tubing movement is evident.

Work order requested by:	_____
Date requested:	
Work performed by:	_____
Date completed:	
Comments/results	

100/00-00-000-00 W0M/00
Surface: 00-00-000-00 W0M

Prepared For
William Domore

Dynamometer Analysis

1. The well was observed and tested for possible causes of knocking at the beginning of the upstroke. The dynamometer test results indicate a sharp load spike approximately 10 to 30 inches into the upstroke. Its reflections are evident throughout the stroke (see page 3). Consider reversing the unit rotation and inspecting the gearbox for possible chipped tooth. Monitor production, allow the well to stabilize and re-dyno to evaluate the conditions, equipment loading and counterbalance requirement.

2. A producing bottomhole pressure of 4674 kPa and an average gradient of 3.82 kPa/m are calculated from a fluid depression Test (report attached). The downhole pump is functioning well with a gross efficiency of 85.6%. No recommendation in increasing the pumping speed is made at this time because the rod string is loaded to a maximum of 94.4% (%Goodman, using a 0.8 service factor).

3. Horsepower requirements at present time are 43.5 hp. Ensure that the well is connected to the 50 hp connection (possible savings of $1325.00 per month in electricity, prime mover rating: 50-60-75 hp).

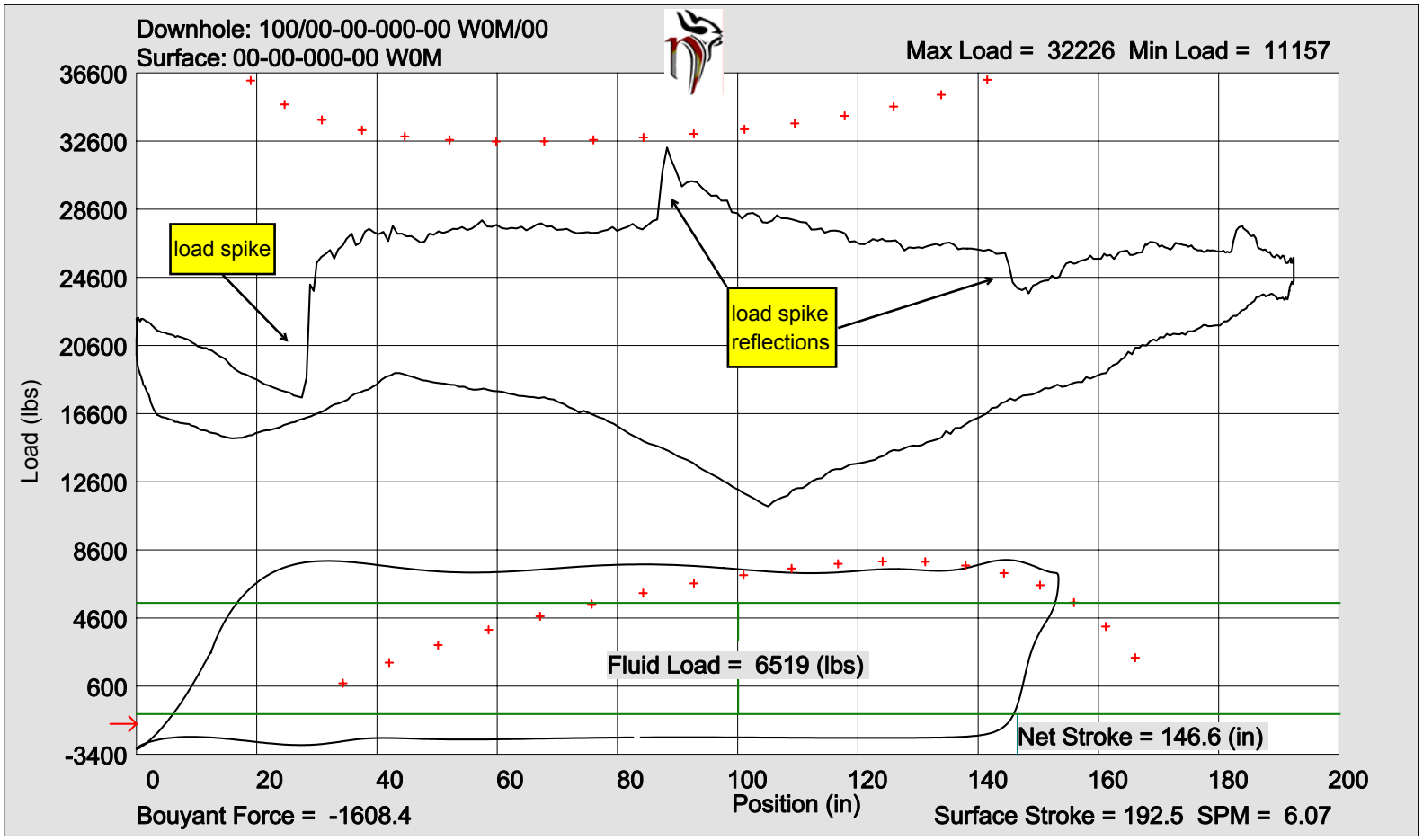
4. The next time the well is serviced, to improve production, ensure the tubing anchor is holding properly. A tubing movement is evident.

Field Observations
Belts are tight and in good condition.
Brakes are in good condition.
Gearbox backlash is not evident.
Polished rod is in good condition.
Check valve is holding properly.
The downhole pump pressured up from 1350 kPa to 3850 kPa in 1 minute before activating the high pressure shutdown.
Casing pressure: 1373 kPa Tubing Pressure: 1350 kPa Initial Fluid level was at 186.5 joints from surface.

NELGAR™ OILFIELD SERVICES LTD.

Prepared by: Scott Finnestad (403)309-2620

xxxx-11-13



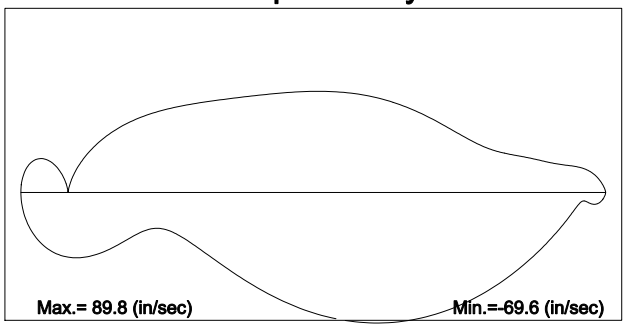
Rod Loading

Depth (m)	Rod Size (mm)	Loads Max (lbs)	Loads Min (lbs)	% Goodman Range Service Factor of (1.0)	(0.9)	(0.8)
0.00	38.1	31725.9	11656.6	57.9	66.8	79.0
10.97	27.0	28515.7	12767.1	43.4	50.1	59.4
460.85	25.4	23936.1	8735.4	45.0	51.4	60.1
906.47	23.8	19750.1	5479.5	45.9	52.0	60.0
1313.38	22.2	16356.1	3111.9	47.1	53.0	60.5
1705.96	20.6	13776.2	1312.7	49.6	55.5	62.9
2652.36	19.0	8205.4	-2874.6	79.4	86.2	94.4
2659.98	19.0	8014.9	-3078.0	79.0	85.7	93.6

Current Production

Oil (m3/day):	9.37
Water (m3/day):	50.18
Gas (E3m3/day):	3.40

Pump Velocity



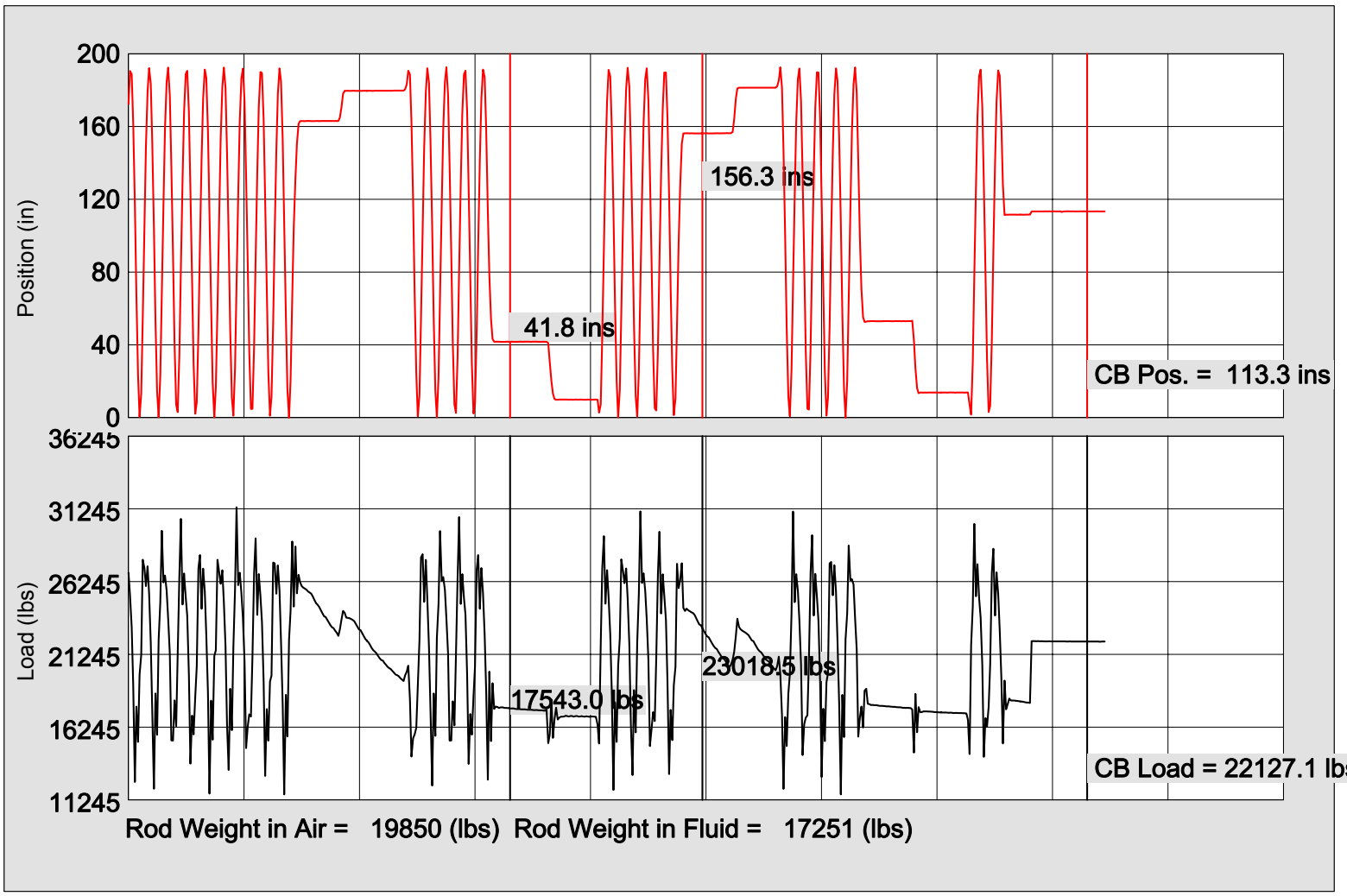
Pump Efficiencies

Pump Size (in): 2.00	Gross	Net
Downhole Stroke (in):	153.38	146.56
Displacement (m3/day):	69.02	65.95
Efficiency (%)	85.62	90.30

Comments

The downhole pumpcard indicates good pump function with a tubing movement of at least 4.0 inches.
A sharp load spike is evident at the beginning of the upstroke. Its reflections are evident throughout the stroke.
Stuffing box friction is evident and adds at least 500 lbs to the polished rod loading. Consider inspecting and lubricating the stuffing box and the packing.

Golden Company Ltd.
Downhole: 100/00-00-000-00 W0M/00
Surface: 00-00-000-00 W0M
Nov 13, xxxx



Comments

The valve checks indicate that the downhole pump has a slight travel valve leak. This is considered normal for high watercut wells.

Golden Company Ltd.

Downhole: 100/00-00-000-00 W0M/00

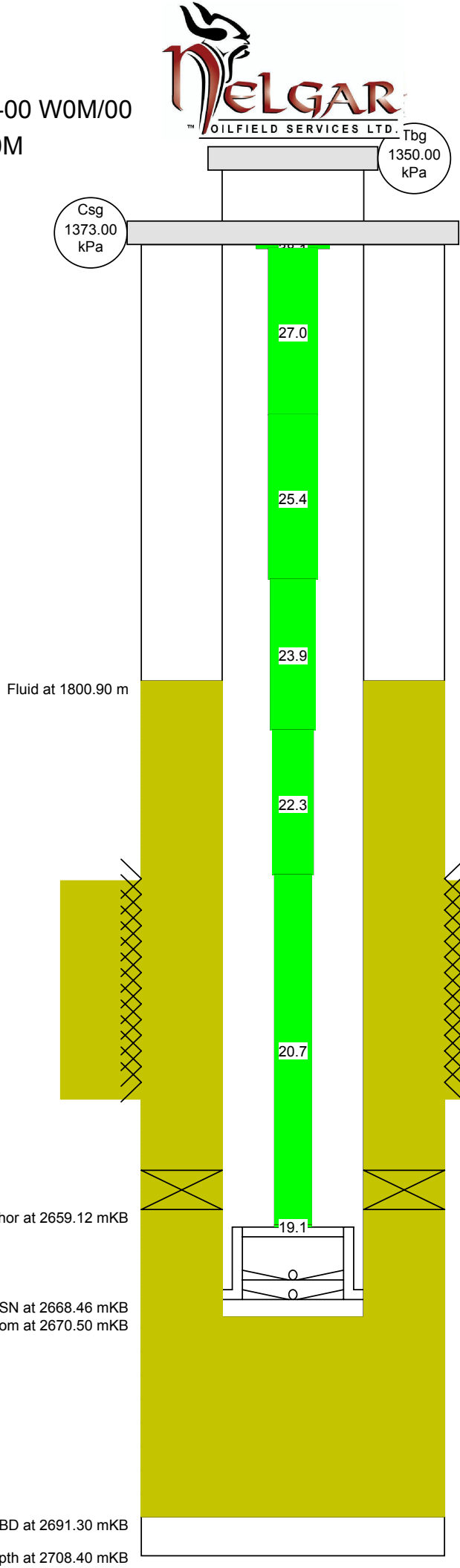
Surface: 00-00-000-00 W0M

Elevations:
KB (m): 863.40
CF (m): 858.04

Casing:
OD (mm): 177.80
ID (mm): 156.24
Weight(kg/m): 38.70
Depth (mKB): 2708.40

Tubing:
OD (mm): 73.00
ID (mm): 62.00
Weight(kg/m): 9.67
Depth (mKB): 2670.50
Number of Jts: 276

Liner:
ID (mm): 0.00
Top (mKB): 0.00
Bottom(mKB): 0.00



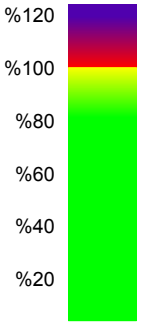
Rod String

Type	Scraper	Rod Dia. (mm)	# Rods	Length (m)
STEEL C	No	38.10	1	10.97
COROD HS	No	27.00	1	449.88
COROD HS	No	25.40	1	445.62
COROD HS	No	23.80	1	406.91
COROD HS	No	22.20	1	392.58
COROD HS	No	20.60	1	946.40
STEEL D	No	19.10	1	7.62

API Pump Description: 25-200 RWBC 30.0- 6.0- 0.0
PSN (mKB): 2668.46

Perforations:
From (mKB) 2624.40 to 2647.40

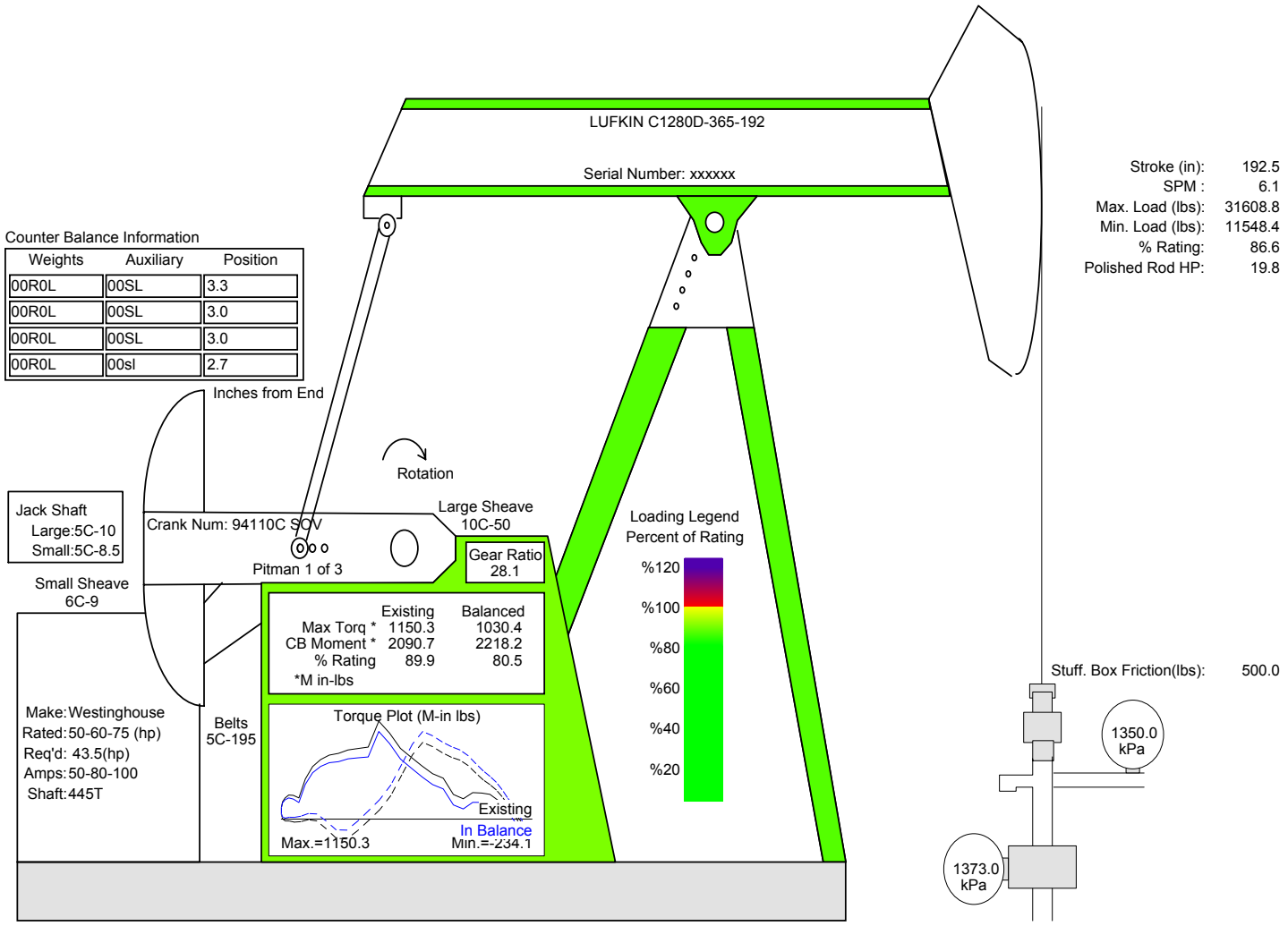
Rod Loading Legend
0.8 Service Factor



Golden Company Ltd.

Downhole: 100/00-00-000-00 W0M/00

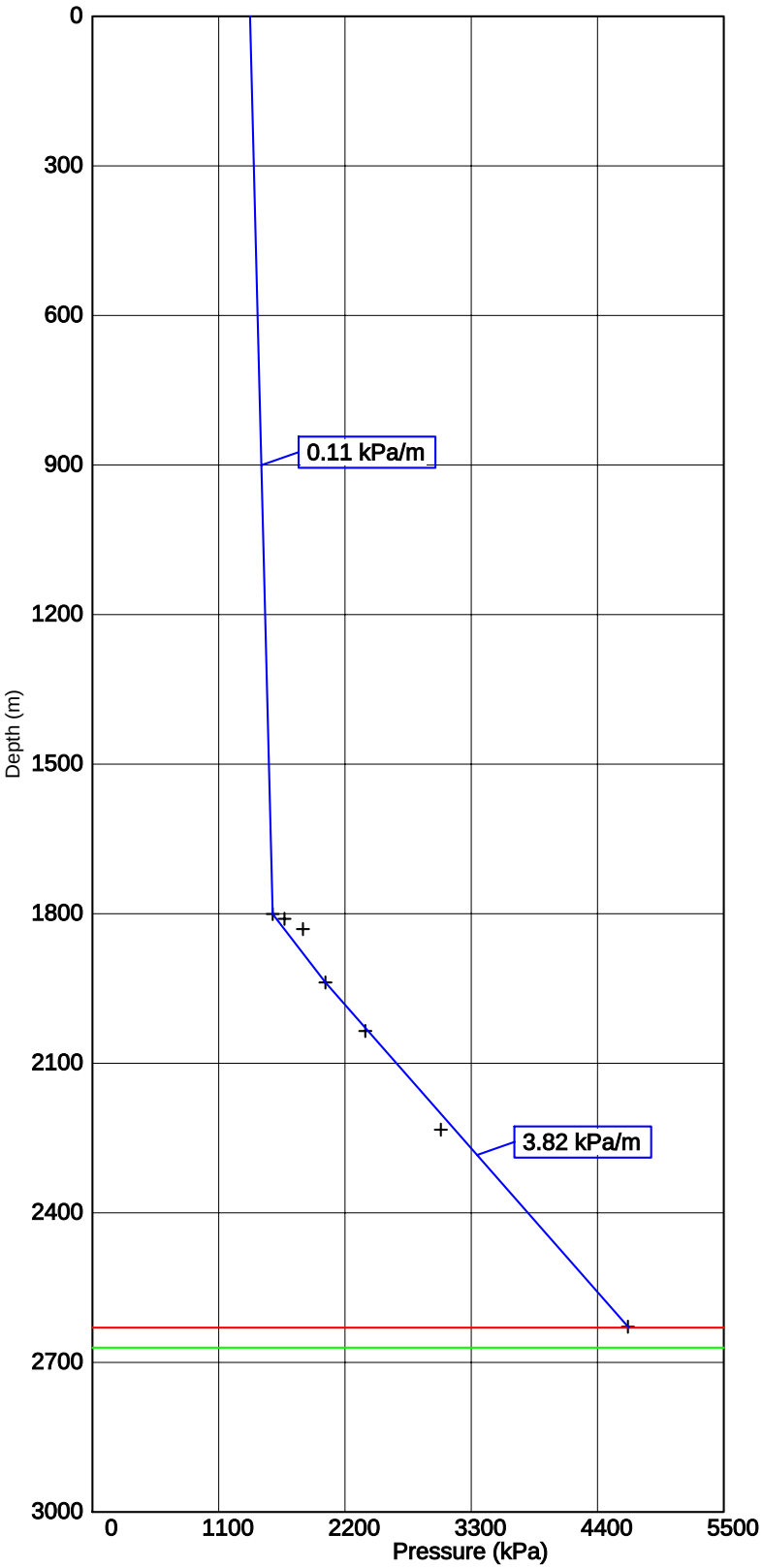
Surface: 00-00-000-00 W0M



Fluid Depression Test

Golden Company Ltd.

Surface:100/00-00-000-00 W0M/00
Downhole:100/00-00-000-00 W0M/00



Test resultsindicate a foamy fluid gradient.
Tubing pressure at 1350, 1345, 1353.1, 1356.8, 1361.1, 1359.9, and 1372.1 kPa respectively.

Wellname:	EMC Carson 16-22-61-12W5	SPM:	6.07
Field name:	Carson	Stroke Length (in):	192.5

Oil Rate (m3pd):	9.37	Gas Rate (M m3pd):	3.40
Water Rate (m3pd):	50.18	Gas Gravity:	0.60

KB to CF (mKB):	5.36	MPP (mKB):	2635.90
Tubing bottom (mKB):	2670.50	MPP (mTVD):	2635.90
Number of Joints:	276	Reservoir Temp (C):	84.00

Date	Time	Joints	Fluid (m)	Casing (kPa)	Interface (kPa)	Gradient (kPa/m)
xxxx-11-13	10:42:00	186.5	1800.9	1373.4	1570.8	0.0
xxxx-11-13	11:13:00	187.5	1810.6	1462.9	1673.9	10.7
xxxx-11-13	12:11:00	189.6	1830.8	1601.5	1834.5	7.9
xxxx-11-13	13:14:00	200.7	1938.0	1760.2	2030.4	1.8
xxxx-11-13	15:13:00	210.8	2035.6	2048.3	2377.9	3.6
xxxx-11-13	19:17:00	231.3	2233.5	2580.8	3036.3	3.3
xxxx-11-14	09:09:00	272.2	2628.4	3859.6	4666.1	4.1

Producing Bottomhole Pressure = 4674.1 kPa

Golden Company
100/00-00-000-00 W0M/00
Surface: 00-00-000-00 W0M

Foreman's Report/Work Order

Work Ordered By: William Domore	Type of work: Dynamometer.
Date work completed: xxxx-12-17	Work completed by: (403)309-2620 NELGAR OILFIELD SERVICES LTD.
Reason for Dynamometer: Evaluate pumping conditions.	Comments: Production potential. Good pump function (gross efficiency 92.5%). Rod string heavily loaded.

Work requested:

The next time the well is serviced, upgrade the existing 19.1 mm grade D rods to a higher strength.
To improve production, ensure the tubing anchor is holding properly (tubing movement evident).

Work order requested by: _____ Date requested:	
Work performed by: _____ Date completed:	
Comments/results	

100/00-00-000-00 W0M/00
Surface: 00-00-000-00 W0M

Prepared For
William Domore

Dynamometer Analysis

1. The unit rotation has been reversed since a previous dyno (xxxx-11-13). As a result, the well is no longer knocking at the beginning of the upstroke and the load spike is not evident in this dynamometer test.

2. The dynamometer test results indicate good pump function with a gross efficiency of 92.5%. The well has been drawn down by 49 joints since last dyno (xxxx-11-13). This has resulted in the equipment loading increase from 94.4% to 110.6% rod string, 86.6% to 91.1% unit structure, 89.9% to 92.8% gearbox (unit well balanced), and 43.5 to 61.6 hp prime mover.

3. To reduce loading, consider decreasing the pumping speed. Please note this may results in production losses.

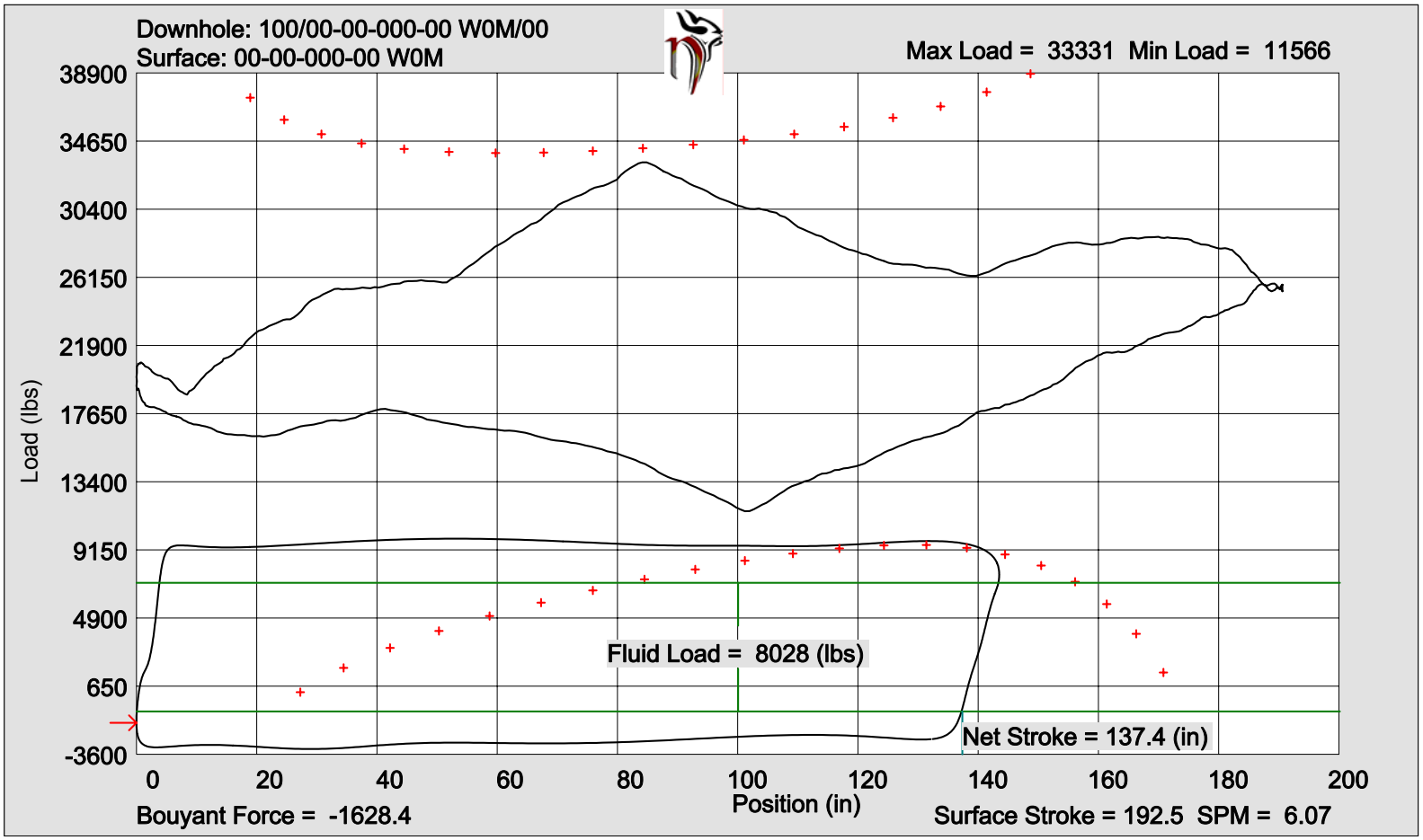
4. The next time the well is serviced, consider upgrading the existing 19.1 mm grade D rods to a higher strength. To improve production, ensure the tubing anchor is holding properly (tubing movement evident).

Field Observations
Belts are tight and in good condition.
Brakes are in good condition.
Gearbox backlash is not evident.
Polished rod is in good condition.
Check valve is holding properly.
The downhole pump pressured up from 1346 kPa to 3852 kPa in 20 seconds before activating the high pressure shutdown.
Casing pressure: 1358 kPa Tubing Pressure: 1346 kPa Initial Fluid level was at 235.5 joints from surface.

Prepared by: Scott Finnestad (403)309-2620

xxxx-12-17

Golden Company Ltd.
Dec 17, XXXX



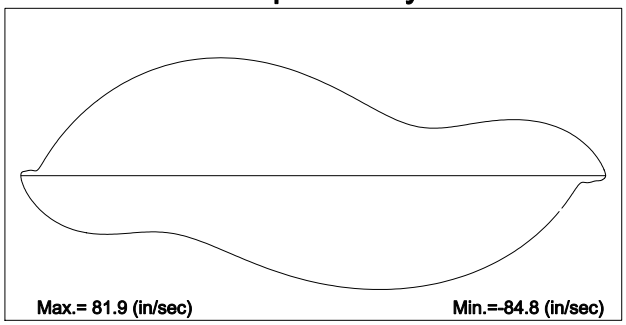
Rod Loading

Depth (m)	Rod Size (mm)	Loads Max (lbs)	Loads Min (lbs)	% Goodman Range Service Factor of (1.0)	(0.9)	(0.8)
0.00	38.1	33231.2	11666.1	62.2	71.8	84.9
10.97	27.0	32583.6	12517.6	55.0	63.6	75.2
460.85	25.4	27947.6	8563.2	57.2	65.3	76.3
906.47	23.8	23570.7	5387.4	58.4	66.1	76.3
1313.38	22.2	19860.2	3070.0	59.7	67.1	76.7
1705.96	20.6	16635.3	1272.7	61.1	68.3	77.4
2652.36	19.0	10042.6	-3052.3	93.3	101.2	110.6
2659.98	19.0	9852.0	-3267.0	92.8	100.6	109.7

Current Production

Oil (m3/day):	6.01
Water (m3/day):	53.72
Gas (E3m3/day):	1.93

Pump Velocity



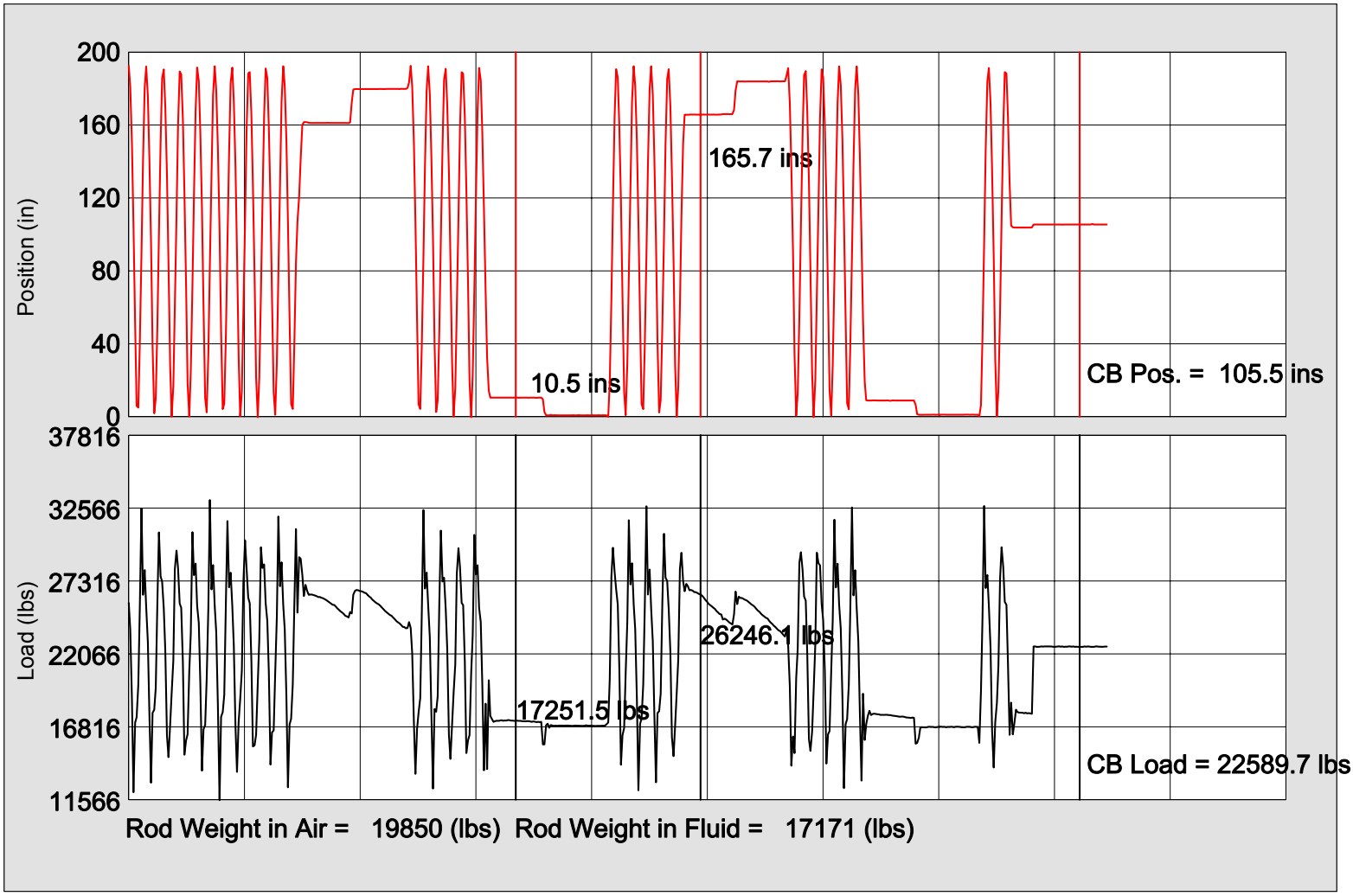
Pump Efficiencies

Pump Size (in): 2.00	Gross	Net
Downhole Stroke (in):	143.52	137.38
Displacement (m3/day):	64.58	61.82
Efficiency (%)	92.49	96.62

Comments

The downhole pumpcard indicates good pump function with tubing movement of 4.0 inches.

Golden Company Ltd.
Downhole: 100/00-00-000-00 W0M/00
Surface: 00-00-000-00 W0M
Dec 17, XXXX



Comments

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Golden Company

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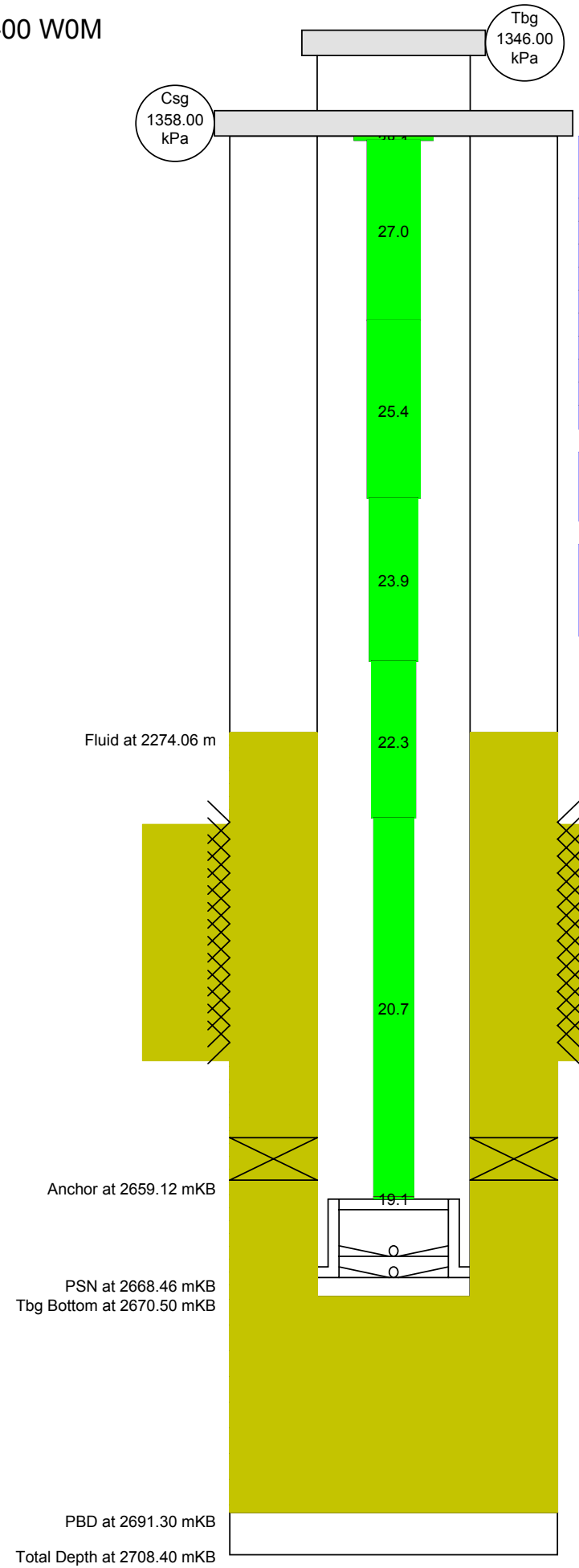

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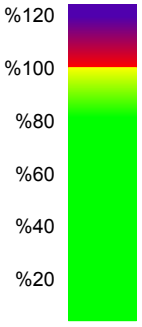

Golden Company Ltd.

Downhole: 100/00-00-000-00 W0M/00

Surface: 00-00-000-00 W0M