Company:Sandia (TESTRUN) ⌐ Theta Oilfield Services, Inc. (gotheta.com)
Well:Well #1 Norris/AOT
Disk file:Sandia(TESTRUN)WELL #1.rsdx 432.561.8101

Comment:requested by JohnDoe, 432.xxx.1234, jdoe@sandiatestrun.net, S.Malone 432.559.2005, smalone@norrisrods.com.

SYSTEM DESIGN SCORE (FOR FULL PUMP AND FLUID LEVEL AT THE PUMP): 73% GRADE: C

BALANCED GEARBOX LOADING SCORE: 70

The gearbox is much bigger than needed because the gearbox loading is only 59%. The ideal range for gearbox loading is between 70% and 95%. If possible, please use a pumping unit with a smaller gearbox size to reduce pumping unit cost.

MAXIMUM ROD LOADING SCORE: 100

No recommendations for improvements are necessary.

STRUCTURE LOADING SCORE: 60

Structural loading at 41 % is very low. Please use a smaller pumping unit is possible or a pumping unit with a lower structural rating so that the loading is between 70% and 95%.

SYSTEM EFFICIENCY SCORE: 80

System efficiency at 35.2% is lower than it can be. To increase efficiency

Use a bigger pump and slower pumping speed
Use longer stroke length
Use more efficient pumping unit
Use a more efficient motor (or different motor type)
Try changing the pumping unit direction of rotation.

BOTTOM MINIMUM STRESS SCORE: 30

The bottom min. stress at the bottom of the rod string is negative which can result is rod buckling. Add sinker bars and if necessary use a lower pumping speed to bring the bottom min. stress between 300 and 650 psi.

MINIMUM POLISHED ROD LOADING SCORE: 100

No recommendations for improvements are necessary.

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INPUT DATA

Strokes per minute:	11	Fluid level	
Run time (hrs/day):	24.0	(ft from surface):	2780
Tubing pres. (psi):	60	(ft over pump):	0
Casing pres. (psi):	50	Stuf.box fr. (lbs):	100
		Pol. rod. diam. 1.25"	

Fluid Properties

Water cut:	90%
Water sp. gravity:	1.04
Oil API gravity:	36.0
Fluid sp. gravity:	0.995

Motor & Power Meter

Power meter	Detent
Elect. cost:	$.06/KWH
Type:	NEMA D
Size:	20 hp

CALCULATED RESULTS (TOTAL SCORE: 73% GRADE: C)

Production rate (bfpd):	203	Peak pol. pod load (lbs):	8736
Oil production (BOPD):	20	Min. pol. rod load (lbs):	2167
Strokes per minute:	11	MPRL/PPRL:	0.248
System eff. (Motor->Pump):	35%	Unit struct. loading:	41%
Permissible load HP:	30	PRHP / PLHP:	0.26
Fluid load on pump (lbs):	2134	Buoyant rod weight (lbs):	3971
Fluid level tvd (ft from surface):	2780	N/No: .125 , Fo/SKr: .061	
Polished rod HP:	7.9		

Prime Mover Speed Variation
Speed variation not considered

Pumping Unit:Lufkin Conventional - New

API Size: C-228-213-86 (Unit ID: CL70)

Crank hole number:	# 1 (out of 4)
Calculated stroke length (in):	86.9
Crank rotation with well to right:	CCW
A dimension adjustment (in)	-.25
Max. cb moment (M in-lbs):	Unknown
Structural unbalance (lbs):	450
Crank offset angle (degrees):	0.0

Torque analysis and electricity consumption

	BALANCED (Min. Energy)	BALANCED (Min Torq)
Peak g'box torq.(M in-lbs):	150	135
Gearbox loading:	66%	59.3%
Cyclic load factor:	1.424	1.426
Max. cb moment (M in-lbs):	186.69	212.45
Counterbalance effect(lbs):	5007	5636
Daily electr.use (Kwh/Day):	208	210
Monthly electric bill:	$380	$384
Electr.cost per bbl fluid:	$0.061	$0.062
Electr.cost per bbl oil:	$0.614	$0.622

Tubing And Pump Information

Tubing O.D. (in):	2.875	Upstr. rod-fl. damp. coeff.:	0.100
Tubing I.D. (in):	2.441	Dnstr. rod-fl. damp. coeff.:	0.100
Pump depth (ft):	2780	Tub.anch.depth (ft):	2647
Pump conditions:	Full		
Pump type:	Insert	Pump vol. efficiency:	85%
Plunger size (in):	1.5	Pump friction (lbs):	200.0

Tubing, Pump And Plunger Calculations

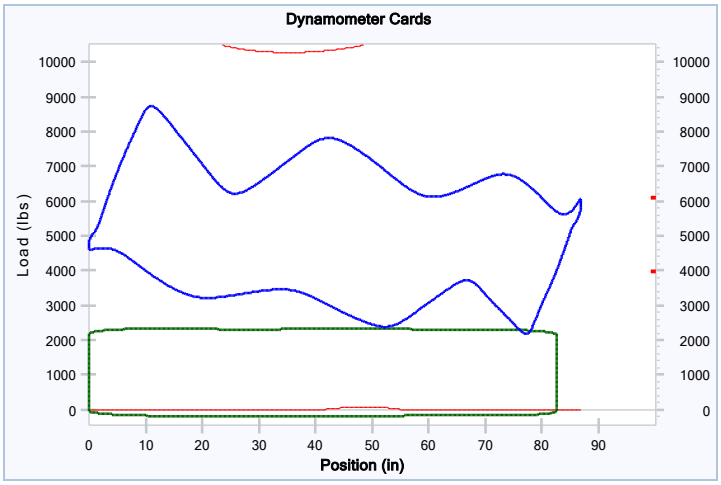
Tubing stretch (in):	.1
Prod. loss due to tubing stretch (bfpd):	0.2
Gross pump stroke (in):	82.7
Pump spacing (in. from bottom):	8.3
Minimum pump length (ft):	11.0
Recommended plunger length (ft):	2.0

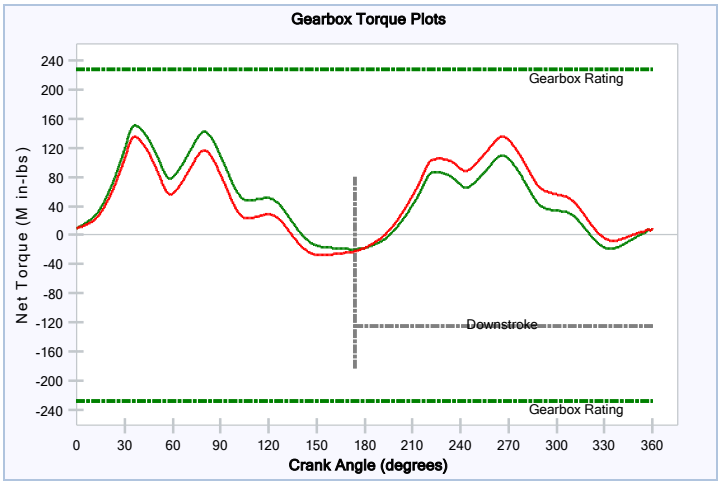
Rod string design

Rod string stress analysis (service factor: 1)

Diameter (inches)	Rod Grade	Length (ft)	Min. Ten. Str. (psi)	Fric. Coeff	Stress Load %	Top Maximum Stress (psi)	Top Minimum Stress (psi)	Bot. Minimum Stress (psi)	# Guides/Rod
0.75	C (API)	2780	90000	0.3	71.2%	19548	5131	-453	2

NOTE: Displayed bottom minimum stress calculations do not include buoyancy effects (top minimum and maximum stresses always include buoyancy).





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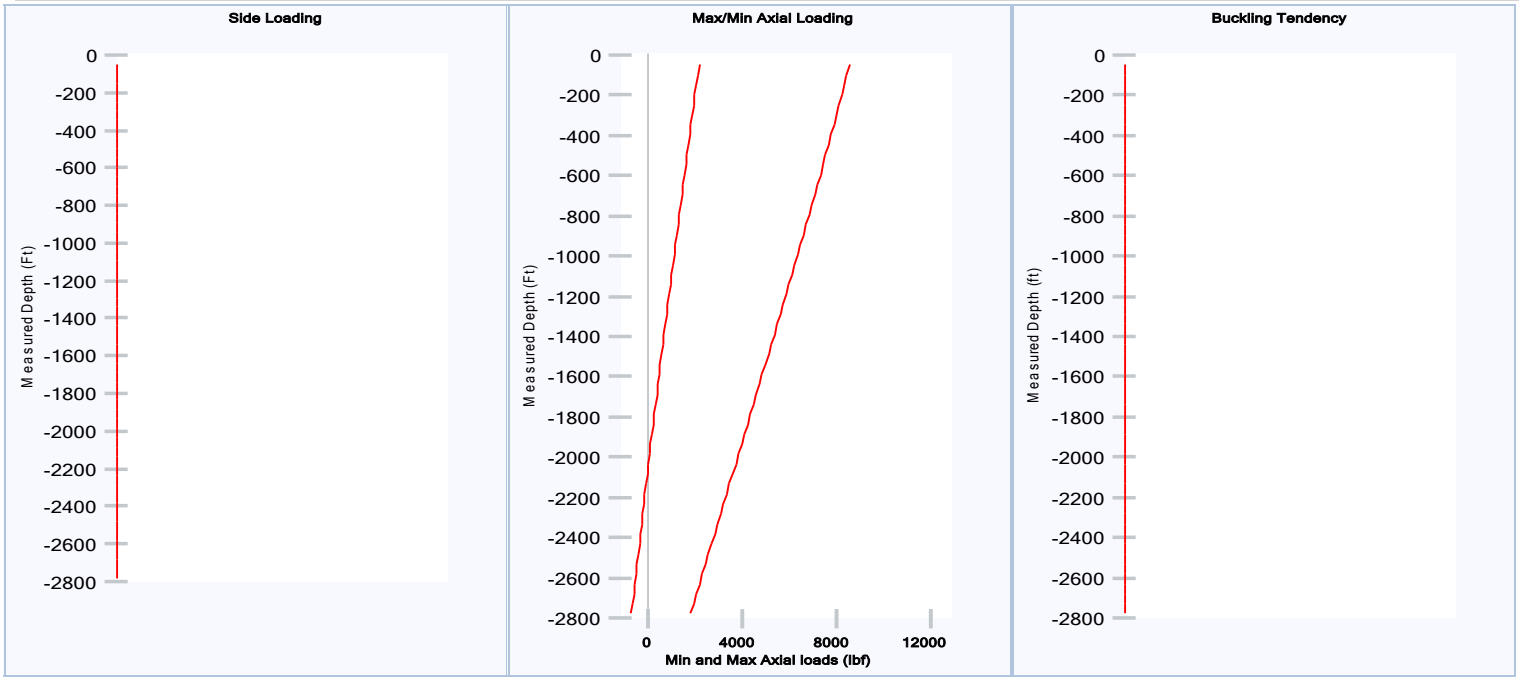
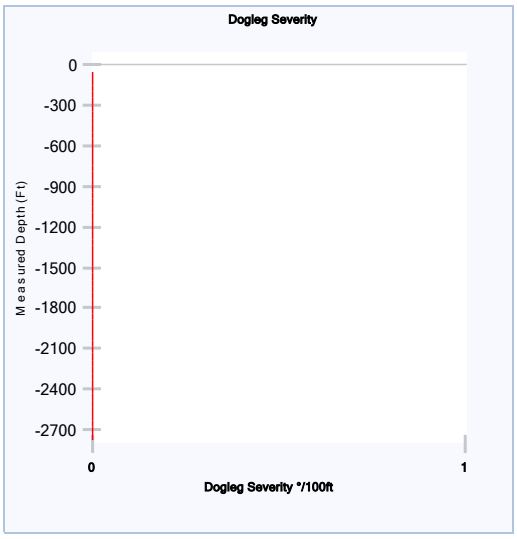
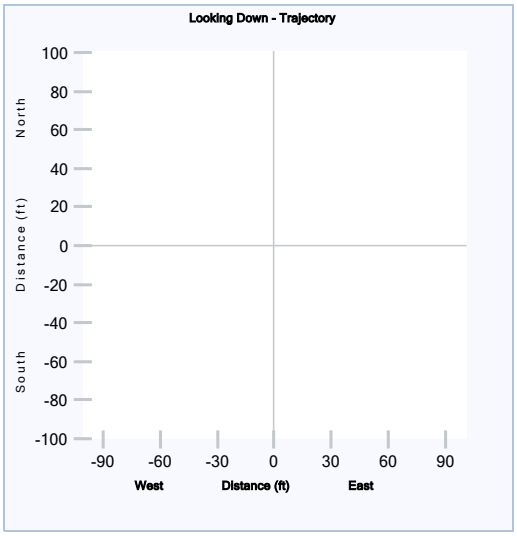
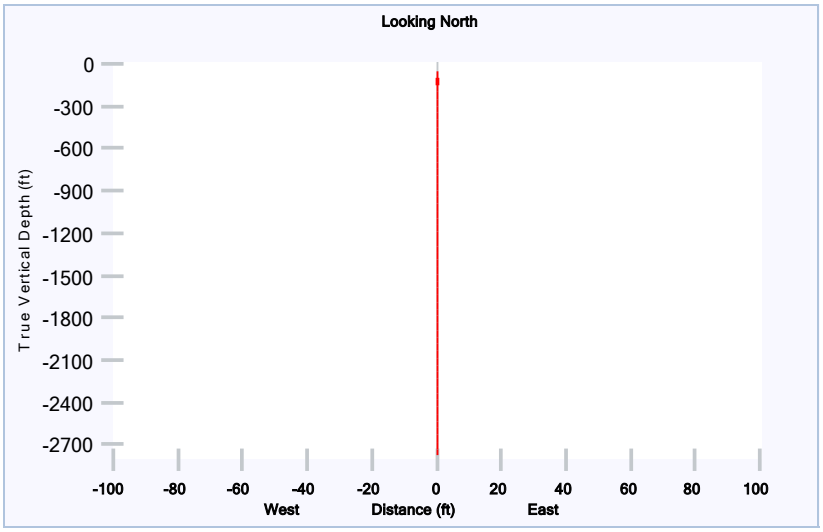
DEVIATION SURVEY PLOT









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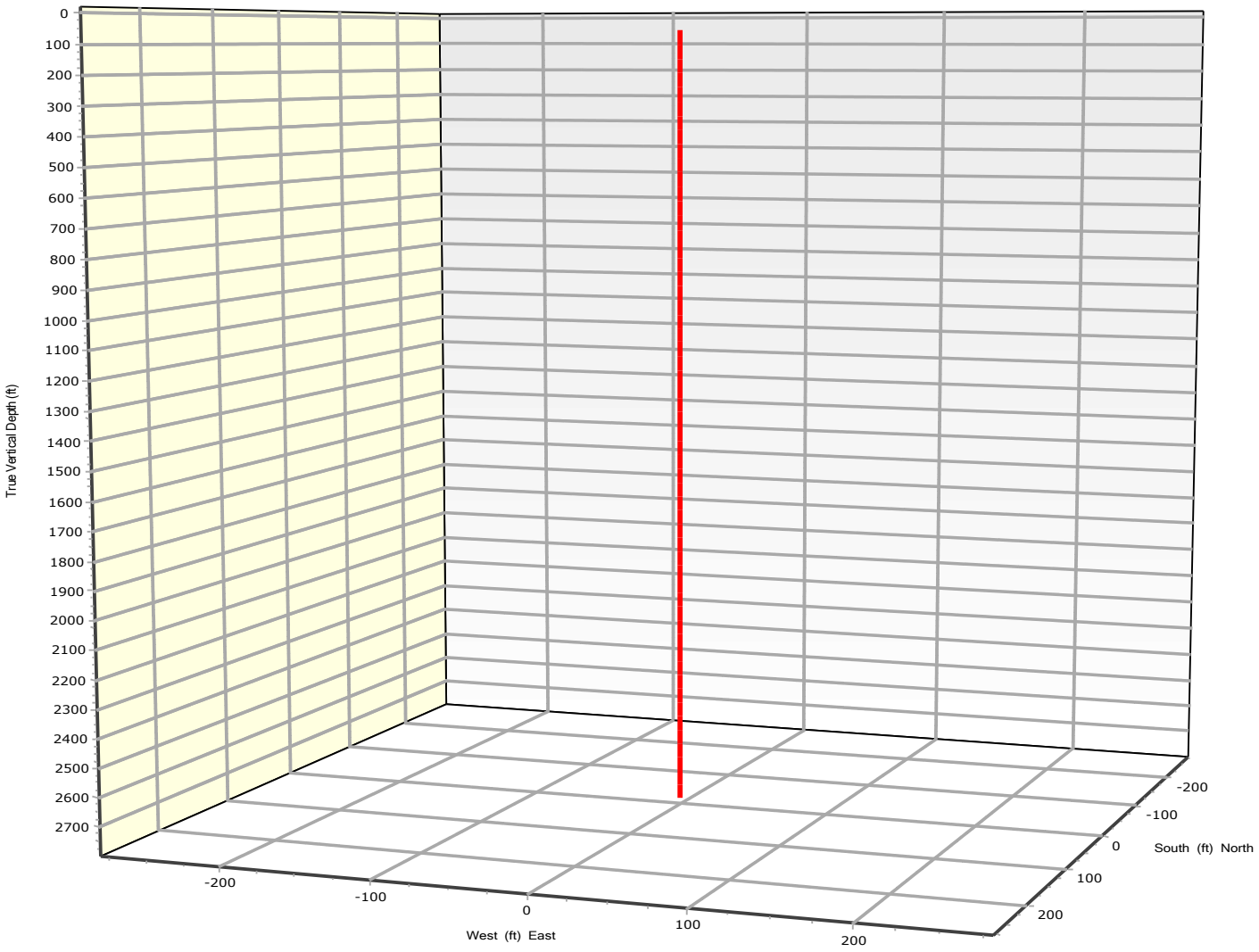

Rod Diameters 3/4"
Guides/Rod: 2

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MEASURED DEVIATION SURVEY

MD (ft)	Inclination (°)	Azimuth (°)	Dogleg sev. °/100ft	TVD (ft)	N-S (ft)	E-W (ft)
0	0	0	0	0	0	0
200	0	0	0	200	0	0
400	0	0	0	400	0	0
600	0	0	0	600	0	0
800	0	0	0	800	0	0
1000	0	0	0	1000	0	0
1200	0	0	0	1200	0	0
1500	0	0	0	1500	0	0
3000	0	0	0	3000	0	0