Appendix A: Report

GNPOC

Torque Drag Normal Analysis Summary Report

Case Name:	Case1	**Date:** 15/10/2016	**Time:** 11:52:02	**Page:**	1
Description:	Side Tracking				
Well Name:	Side Tracking	**Project Name:**	Horizontal Drilling		
Well Description:	Horizontal	**Project Description:**	Side Tracking		

OPERATING PARAMETERS

			String Side		Annulus Side	
			From Bit	Mud Weight	From Bit	Mud Weight
			m	kg/m3	m	kg/m3
Cased Hole Friction	0.25					
Open Hole Friction	0.30					
Measured Depth of Bit	2061.61	m				
Hoisting Equipment Weight	498.8	kN	2061.61	0	2061.61	0
Annulus Surface Pressure		kPa				
String Surface Pressure		kPa				

ANALYSIS OPTIONS

Buckling Calculations	**Curvilinear Loading**
Sheave Friction Cacluations	**OFF**
Side Force Calculation	**Soft String**
Viscous Torque and Drag	**OFF**

DRILLSTRING

	<-------- LENGTH -------->		<--BODY-->		<---- STABILIZER / TOOL JOINT ---->						
TYPE	**COMPONENT**	**TOTAL**	**OD**	**ID**	**LENGTH**	**OD**	**ID**	**FISHNECK**	**WEIGHT**	**MTL GRADE**	**CLASS***
	m	m	mm	mm	m	mm	mm	m	kg/m		
DP	1684.871	1684.871	88.90	70.21		122.24	53.98		21.86	CS_API 5D/7 S	P
HW	246.888	1931.759	88.90	57.15		120.65	58.75		34.53	CS_1340 MOD 1340 MOD	
JAR	9.754	1941.513	120.65	57.15					69.62	CS_API 5D/7 4145H MOD (1)	
DC	91.440	2032.953	120.65	57.15					69.60	CS_API 5D/7 4145H MOD (1)	
DC	9.150	2042.103	120.65	57.15					69.60	CS_API 5D/7 4145H MOD (1)	
MWD	9.144	2051.247	120.65	40.64					85.87	SS_15-15LC 15-15LC MOD (1)	
BS	0.914	2052.161	112.78	36.58					71.60	CS_API 5D/7 4145H MOD (1)	
BHM	9.144	2061.305	120.65	44.45					77.56	CS_API 5D/7 4145H MOD (1)	1
BIT	0.305	2061.610	152.40						52.09		

WELLBORE

TYPE	**SECTION DEPTH**	**SECTION LENGTH**	**EFFECTIVE INSIDE DIAMETER**	**COEFFICIENT OF FRICTION**	**VOLUME EXCESS**
	m	m	mm		%
CAS	30.00	30.000	387.35	0.25	
CAS	962.00	932.000	224.41	0.25	
CAS	1200.00	238.000	157.07	0.25	
OH	2061.61	861.610	157.07	0.30	0.00

Wellbore friction factors not used (calibrated).

Survey **Tortuosity: None** **Calculation Method: Minimum Curvature**

Md m	**Incl** deg	**Direc** deg	**Tvd** m	**Build** deg/30m	**Walk** deg/30m	**Dls** deg/30m
0.00	0.00	238.90	0.00	0.000	0.000	0.000
1200.00	0.00	238.90	1200.00	0.000	0.000	0.000
1230.00	3.00	238.90	1229.99	3.000	0.000	3.000
1260.00	6.00	238.90	1259.89	3.000	0.000	3.000
1290.00	9.00	238.90	1289.63	3.000	0.000	3.000
1320.00	12.00	238.90	1319.12	3.000	0.000	3.000
1350.00	15.00	238.90	1348.29	3.000	0.000	3.000
1380.00	18.00	238.90	1377.05	3.000	0.000	3.000
1410.00	21.00	238.90	1405.33	3.000	0.000	3.000
1440.00	24.00	238.90	1433.04	3.000	0.000	3.000
1470.00	27.00	238.90	1460.12	3.000	0.000	3.000
1500.00	30.00	238.90	1486.48	3.000	0.000	3.000
1530.00	33.00	238.90	1512.06	3.000	0.000	3.000
1560.00	36.00	238.90	1536.78	3.000	0.000	3.000
1590.00	39.00	238.90	1560.57	3.000	0.000	3.000
1620.00	42.00	238.90	1583.38	3.000	0.000	3.000
1642.50	44.25	238.90	1599.80	3.000	0.000	3.000
1672.50	44.25	238.90	1621.29	0.000	0.000	0.000
1702.50	44.25	238.90	1642.78	0.000	0.000	0.000
1732.50	44.25	238.90	1664.27	0.000	0.000	0.000
1762.50	44.25	238.90	1685.76	0.000	0.000	0.000
1792.50	44.25	238.90	1707.25	0.000	0.000	0.000
1822.50	44.25	238.90	1728.74	0.000	0.000	0.000
1852.50	44.25	238.90	1750.23	0.000	0.000	0.000
1882.50	44.25	238.90	1771.72	0.000	0.000	0.000
1912.50	44.25	238.90	1793.21	0.000	0.000	0.000
1942.50	44.25	238.90	1814.70	0.000	0.000	0.000
1972.50	44.25	238.90	1836.18	0.000	0.000	0.000

GNPOC

Torque Drag Normal Analysis Summary Report

Case Name:	Case1	**Date:** 15/10/2016	**Time:** 11:52:02	**Page:**	2
Description:	Side Tracking				
Well Name:	Side Tracking	**Project Name:**	Horizontal Drilling		
Well Description:	Horizontal	**Project Description:**	Side Tracking		

Survey **Tortuosity: None** **Calculation Method: Minimum Curvature**

Md m	Incl deg	Direc deg	Tvd m	Build deg/30m	Walk deg/30m	Dls deg/30m
2002.50	44.25	238.90	1857.67	0.000	0.000	0.000
2032.50	44.25	238.90	1879.16	0.000	0.000	0.000
2061.61	44.25	238.90	1900.01	0.000	0.000	0.000

MECHANICAL LIMITATIONS

Overpull Margin
During a tripping out operation 1073.8 kN **using** 90.00 **% of yield**

Minimum Weight on Bit to Sinusoidal Buckle
During a rotating on bottom operation 197.4 kN **at** 1177.60 m

Minimum Weight on Bit to Helical Buckle
During a rotating on bottom operation 206.0 kN **at** 1177.60 m

Explanation of Buckling & Stress Codes

Buckling: ~=No Buckling S=Sinusoidal H=Helical L=Lockup **Stress: T=Torque, F=Fatigue, X=Exceeds 90.0% of Yield, Y=Yield reached**

LOAD CONDITION	STRESS / BUCKLING		TORQUE AT THE ROTARY TABLE N-m	TOTAL WINDUP WITH/WITHOUT BIT TORQUE revs	 revs	MEASURED WEIGHT kN	TOTAL STRETCH m	AXIAL STRESS=0 DISTANCE FROM SURFACE / BIT m	 m	NEUTRAL POINT DISTANCE FROM SURFACE / BIT m	 m
TRIPPING OUT	~~~	~	3613.8	3.0	3.0	918.4	0.796	1846.88	214.73	2061.61	0.00
ROTATING ON BOTTOM	~~~	~	3476.0	3.1	2.3	836.6	0.494	1609.72	451.89	1841.84	219.77
TRIPPING IN	~~~	~	3462.4	2.9	2.9	904.6	0.752	1824.57	237.04	2061.61	0.00
ROTATING OFF BOTTOM	~~~	~	3569.4	3.0	3.0	912.1	0.776	1837.25	224.36	2061.61	0.00

GNPOC

Pressure - ECD/Trip Rates

Case Name:	Case1	**Date:** 15/10/2016	**Time:** 11:56:16	**Page:**	1
Description:	Side Tracking				
Well Name:	Side Tracking	**Project Name:**	Horizontal Drilling		
Well Description:	Horizontal	**Project Description:**	Side Tracking		

GENERAL INFORMATION

WELL MD	2061.61	m
SURFACE EQUIPMENT TYPE	**IADC**	
40'x3"StdPipe+45'x2"Hose+4'x2"Swivel+40'x2.25"Kelly		

MUD PROPERTIES: Bingham Plastic

MUD WEIGHT	1038	kg/m3
MUD YIELD POINT	14.84	Pa
MUD PLASTIC VISCOSITY	13.0	mPa-s
MUD POWER INDEX (n)	0.000	
MUD CONSISTENCY INDEX (k)	0.000	lb/sec^n

JET NOZZLE INFORMATION

JET NOZZLE SIZES		mm
TOTAL FLOW AREA	cm2	

DRILLSTRING

TYPE	LENGTH COMPONENT (m)	LENGTH TOTAL (m)	BODY OD (mm)	BODY ID (mm)	STABILIZER / TOOL JOINT LENGTH (m)	STABILIZER / TOOL JOINT OD (mm)	STABILIZER / TOOL JOINT ID (mm)	FISHNECK (m)	WEIGHT (kg/m)	MTL GRADE	CLASS*
DP	1684.871	1684.871	88.90	70.21		122.24	53.96		21.86	CS_API 5D/7 S	P
HW	246.888	1931.759	88.90	57.15		120.65	58.75		34.53	CS_1340 MOD 1340 MOD	
JAR	9.754	1941.513	120.65	57.15					69.62	CS_API 5D/7 4145H MOD (1)	
DC	91.440	2032.953	120.65	57.15					69.60	CS_API 5D/7 4145H MOD (1)	
DC	9.150	2042.103	120.65	57.15					69.60	CS_API 5D/7 4145H MOD (1)	
MWD	9.144	2051.247	120.65	40.64					85.87	SS_15-15LC 15-15LC MOD (1)	
BS	0.914	2052.161	112.78	36.58					71.60	CS_API 5D/7 4145H MOD (1)	
BHM	9.144	2061.305	120.65	44.45					77.56	CS_API 5D/7 4145H MOD (1)	1
BIT	0.305	2061.610	152.40						52.09		

COUPLING

TYPE	LENGTH COMPONENT (m)	LENGTH TOTAL (m)	BODY OD (mm)	BODY ID (mm)	AVG. JOINT LEN. (m)	COUPLINGS OUTSIDE LENGTH (m)	COUPLINGS ID (mm)
DP	1684.871	1684.871	88.90	70.21			
HW	246.888	1931.759	88.90	57.15			
JAR	9.754	1941.513	120.65	57.15			
DC	91.440	2032.953	120.65	57.15			
DC	9.150	2042.103	120.65	57.15			
MWD	9.144	2051.247	120.65	40.64			
BS	0.914	2052.161	112.78	36.58			
BHM	9.144	2061.305	120.65	44.45			
BIT	0.305	2061.610	152.40				

WELLBORE

TYPE	SECTION DEPTH (m)	SECTION LENGTH (m)	EFFECTIVE INSIDE DIAMETER (mm)	COEFFICIENT OF FRICTION	VOLUME EXCESS (%)
CAS	30.00	30.000	387.35	0.25	
CAS	962.00	932.000	224.41	0.25	
CAS	1200.00	238.000	157.07	0.25	
OH	2061.61	861.610	157.07	0.30	0.00

Survey **Tortuosity: None** **Calculation Method: Minimum Curvature**

Md (m)	Incl (deg)	Direc (deg)	Tvd (m)	Build (deg/30m)	Walk (deg/30m)	Dls (deg/30m)
0.00	0.00	238.90	0.00	0.000	0.000	0.000
1200.00	0.00	238.90	1200.00	0.000	0.000	0.000
1230.00	3.00	238.90	1229.99	3.000	0.000	3.000
1260.00	6.00	238.90	1259.89	3.000	0.000	3.000
1290.00	9.00	238.90	1289.63	3.000	0.000	3.000
1320.00	12.00	238.90	1319.12	3.000	0.000	3.000
1350.00	15.00	238.90	1348.29	3.000	0.000	3.000
1380.00	18.00	238.90	1377.05	3.000	0.000	3.000
1410.00	21.00	238.90	1405.33	3.000	0.000	3.000
1440.00	24.00	238.90	1433.04	3.000	0.000	3.000
1470.00	27.00	238.90	1460.12	3.000	0.000	3.000

GNPOC

Pressure - ECD/Trip Rates

Case Name:	Case1	**Date:** 15/10/2016	**Time:** 11:56:16	**Page:**	1
Description:	Side Tracking				
Well Name:	Side Tracking	**Project Name:**	Horizontal Drilling		
Well Description:	Horizontal	**Project Description:**	Side Tracking		

GENERAL INFORMATION

WELL MD	2061.61	m
SURFACE EQUIPMENT TYPE	**IADC**	
40'x3"StdPipe+45'x2"Hose+4'x2"Swivel+40'x2.25"Kelly		

MUD PROPERTIES: Bingham Plastic

MUD WEIGHT	1038	kg/m3
MUD YIELD POINT	14.84	Pa
MUD PLASTIC VISCOSITY	13.0	mPa-s
MUD POWER INDEX (n)	0.000	
MUD CONSISTENCY INDEX (k)	0.000	lb/sec^n

JET NOZZLE INFORMATION

JET NOZZLE SIZES		mm
TOTAL FLOW AREA	cm2	

DRILLSTRING

TYPE	LENGTH COMPONENT (m)	LENGTH TOTAL (m)	BODY OD (mm)	BODY ID (mm)	STABILIZER / TOOL JOINT LENGTH (m)	STABILIZER / TOOL JOINT OD (mm)	STABILIZER / TOOL JOINT ID (mm)	FISHNECK (m)	WEIGHT (kg/m)	MTL GRADE	CLASS*
DP	1684.871	1684.871	88.90	70.21		122.24	53.96		21.86	CS_API 5D/7 S	P
HW	246.888	1931.759	88.90	57.15		120.65	58.75		34.53	CS_1340 MOD 1340 MOD	
JAR	9.754	1941.513	120.65	57.15					69.62	CS_API 5D/7 4145H MOD (1)	
DC	91.440	2032.953	120.65	57.15					69.60	CS_API 5D/7 4145H MOD (1)	
DC	9.150	2042.103	120.65	57.15					69.60	CS_API 5D/7 4145H MOD (1)	
MWD	9.144	2051.247	120.65	40.64					85.87	SS_15-15LC 15-15LC MOD (1)	
BS	0.914	2052.161	112.78	36.58					71.60	CS_API 5D/7 4145H MOD (1)	
BHM	9.144	2061.305	120.65	44.45					77.56	CS_API 5D/7 4145H MOD (1)	1
BIT	0.305	2061.610	152.40						52.09		

COUPLING

TYPE	LENGTH COMPONENT (m)	LENGTH TOTAL (m)	BODY OD (mm)	BODY ID (mm)	AVG. JOINT LEN. (m)	COUPLINGS OUTSIDE LENGTH (m)	COUPLINGS ID (mm)
DP	1684.871	1684.871	88.90	70.21			
HW	246.888	1931.759	88.90	57.15			
JAR	9.754	1941.513	120.65	57.15			
DC	91.440	2032.953	120.65	57.15			
DC	9.150	2042.103	120.65	57.15			
MWD	9.144	2051.247	120.65	40.64			
BS	0.914	2052.161	112.78	36.58			
BHM	9.144	2061.305	120.65	44.45			
BIT	0.305	2061.610	152.40				

WELLBORE

TYPE	SECTION DEPTH (m)	SECTION LENGTH (m)	EFFECTIVE INSIDE DIAMETER (mm)	COEFFICIENT OF FRICTION	VOLUME EXCESS (%)
CAS	30.00	30.000	387.35	0.25	
CAS	962.00	932.000	224.41	0.25	
CAS	1200.00	238.000	157.07	0.25	
OH	2061.61	861.610	157.07	0.30	0.00

Survey **Tortuosity: None** **Calculation Method: Minimum Curvature**

Md (m)	Incl (deg)	Direc (deg)	Tvd (m)	Build (deg/30m)	Walk (deg/30m)	Dls (deg/30m)
0.00	0.00	238.90	0.00	0.000	0.000	0.000
1200.00	0.00	238.90	1200.00	0.000	0.000	0.000
1230.00	3.00	238.90	1229.99	3.000	0.000	3.000
1260.00	6.00	238.90	1259.89	3.000	0.000	3.000
1290.00	9.00	238.90	1289.63	3.000	0.000	3.000
1320.00	12.00	238.90	1319.12	3.000	0.000	3.000
1350.00	15.00	238.90	1348.29	3.000	0.000	3.000
1380.00	18.00	238.90	1377.05	3.000	0.000	3.000
1410.00	21.00	238.90	1405.33	3.000	0.000	3.000
1440.00	24.00	238.90	1433.04	3.000	0.000	3.000
1470.00	27.00	238.90	1460.12	3.000	0.000	3.000

GNPOC

Pressure - ECD/Trip Rates

Case Name:	Case1	**Date:** 15/10/2016	**Time:** 11:56:16	**Page:**	3
Description:	Side Tracking				
Well Name:	Side Tracking	**Project Name:**	Horizontal Drilling		
Well Description:	Horizontal	**Project Description:**	Side Tracking		

SURGE: CLOSED END

TRIP	<--- BIT --->		<--- CASING SHOE --->		<--- TD --->	
TIME/STD	PRESSURE	ECD	PRESSURE	ECD	PRESSURE	ECD
sec	kPa	kg/m3	kPa	kg/m3	kPa	kg/m3
180	21345.1	1146	20102.2	1134	21345.1	1146
190	21343.3	1145	20101.2	1134	21343.3	1145
200	21341.7	1145	20100.2	1134	21341.7	1145

GNPOC
Hole Cleaning

Case Name:	Case1	**Date:** 15/10/2016 **Time:** 12:00:52	**Page:** 1
Description:	Side Tracking		
Well Name:	Side Tracking	**Project Name:**	Horizontal Drilling
Well Description:	Horizontal	**Project Description:**	Side Tracking

GENERAL INFORMATION

PUMP RATE	0.9085	m3/min
CUTTINGS DIAMETER	3.18	mm
CUTTINGS DENISITY	2.500	sg
BED POROSITY	36.00	%
ROP	21.99	m/hr
WELL MD	2061.61	m
SURFACE RPM	90	rpm

MUD PROPERTIES: Bingham Plastic

MUD WEIGHT	1038	kg/m3
MUD YIELD POINT	14.84	Pa
MUD PLASTIC VISCOSITY	13.0	mPa-s
MUD POWER INDEX (n)	0.000	
MUD CONSISTENCY INDEX (k)	0.000	lb/sec^n

BOOSTER PUMPS (not in operation)

INJECTION DEPTH (MD)	0.00	m	**INJECTION TEMPERATURE**	-17.78	deg C	**INJECTION RATE**	0.0000 m3/min

BACK REAMING

MAX. BACK REAMING RATE	0.00	m/hr

CUTTINGS

SETTLING VELOCITY	0.06	m/min

MINIMUM FLOW RATE

MINIMUM FLOW RATE FOR CUTTINGS TRANSPORT IS	2.2871	m3/min	**AT**	0.00 m

DRILLSTRING

	<-------- LENGTH -------->		<--BODY-->		<---- STABILIZER / TOOL JOINT ---->						
TYPE	**COMPONENT**	**TOTAL**	**OD**	**ID**	**LENGTH**	**OD**	**ID**	**FISHNECK**	**WEIGHT**	**MTL GRADE**	**CLASS***
	m	m	mm	mm	m	mm	mm	m	kg/m		
DP	1684.871	1684.871	88.90	70.21		122.24	53.98		21.86	CS_API 5D/7 S	P
HW	246.888	1931.759	88.90	57.15		120.65	58.75		34.53	CS_1340 MOD 1340 MOD	
JAR	9.754	1941.513	120.65	57.15					69.62	CS_API 5D/7 4145H MOD (1)	
DC	91.440	2032.953	120.65	57.15					69.60	CS_API 5D/7 4145H MOD (1)	
DC	9.150	2042.103	120.65	57.15					69.60	CS_API 5D/7 4145H MOD (1)	
MWD	9.144	2051.247	120.65	40.64					85.87	SS_15-15LC 15-15LC MOD (1)	
BS	0.914	2052.161	112.78	36.58					71.60	CS_API 5D/7 4145H MOD (1)	
BHM	9.144	2061.305	120.65	44.45					77.56	CS_API 5D/7 4145H MOD (1)	1
BIT	0.305	2061.610	152.40						52.09		

COUPLING

	<-------- LENGTH -------->		<--BODY-->			<----------COUPLINGS---------->	
TYPE	**COMPONENT**	**TOTAL**	**OD**	**ID**	**AVG. JOINT LEN.**	**OUTSIDE LENGTH**	**ID**
	m	m	mm	mm	m	m	mm
DP	1684.871	1684.871	88.90	70.21			
HW	246.888	1931.759	88.90	57.15			
JAR	9.754	1941.513	120.65	57.15			
DC	91.440	2032.953	120.65	57.15			
DC	9.150	2042.103	120.65	57.15			
MWD	9.144	2051.247	120.65	40.64			
BS	0.914	2052.161	112.78	36.58			
BHM	9.144	2061.305	120.65	44.45			
BIT	0.305	2061.610	152.40				

WELLBORE

TYPE	**SECTION DEPTH**	**SECTION LENGTH**	**EFFECTIVE INSIDE DIAMETER**	**COEFFICIENT OF FRICTION**	**VOLUME EXCESS**
	m	m	mm		%
CAS	30.00	30.000	387.35	0.25	
CAS	962.00	932.000	224.41	0.25	
CAS	1200.00	238.000	157.07	0.25	
OH	2061.61	861.610	157.07	0.30	0.00

Survey **Tortuosity: None** **Calculation Method: Minimum Curvature**

Md	**Incl**	**Direc**	**Tvd**	**Build**	**Walk**	**Dls**
m	deg	deg	m	deg/30m	deg/30m	deg/30m
0.00	0.00	238.90	0.00	0.000	0.000	0.000
1200.00	0.00	238.90	1200.00	0.000	0.000	0.000
1230.00	3.00	238.90	1229.99	3.000	0.000	3.000
1260.00	6.00	238.90	1259.89	3.000	0.000	3.000
1290.00	9.00	238.90	1289.63	3.000	0.000	3.000
1320.00	12.00	238.90	1319.12	3.000	0.000	3.000
1350.00	15.00	238.90	1348.29	3.000	0.000	3.000

GNPOC
Hole Cleaning

Case Name:	Case1	**Date:**	15/10/2016	**Time:**	12:00:52 **Page:** 2
Description:	Side Tracking				
Well Name:	Side Tracking	**Project Name:**	Horizontal Drilling		
Well Description:	Horizontal	**Project Description:**	Side Tracking		

Survey **Tortuosity: None** **Calculation Method: Minimum Curvature**

Md m	Incl deg	Direc deg	Tvd m	Build deg/30m	Walk deg/30m	Dls deg/30m
1380.00	18.00	238.90	1377.05	3.000	0.000	3.000
1410.00	21.00	238.90	1405.33	3.000	0.000	3.000
1440.00	24.00	238.90	1433.04	3.000	0.000	3.000
1470.00	27.00	238.90	1460.12	3.000	0.000	3.000
1500.00	30.00	238.90	1486.48	3.000	0.000	3.000
1530.00	33.00	238.90	1512.06	3.000	0.000	3.000
1560.00	36.00	238.90	1536.78	3.000	0.000	3.000
1590.00	39.00	238.90	1560.57	3.000	0.000	3.000
1620.00	42.00	238.90	1583.38	3.000	0.000	3.000
1642.50	44.25	238.90	1599.80	3.000	0.000	3.000
1672.50	44.25	238.90	1621.29	0.000	0.000	0.000
1702.50	44.25	238.90	1642.78	0.000	0.000	0.000
1732.50	44.25	238.90	1664.27	0.000	0.000	0.000
1762.50	44.25	238.90	1685.76	0.000	0.000	0.000
1792.50	44.25	238.90	1707.25	0.000	0.000	0.000
1822.50	44.25	238.90	1728.74	0.000	0.000	0.000
1852.50	44.25	238.90	1750.23	0.000	0.000	0.000
1882.50	44.25	238.90	1771.72	0.000	0.000	0.000
1912.50	44.25	238.90	1793.21	0.000	0.000	0.000
1942.50	44.25	238.90	1814.70	0.000	0.000	0.000
1972.50	44.25	238.90	1836.18	0.000	0.000	0.000
2002.50	44.25	238.90	1857.67	0.000	0.000	0.000
2032.50	44.25	238.90	1879.16	0.000	0.000	0.000
2061.61	44.25	238.90	1900.01	0.000	0.000	0.000

CUTTINGS TRANSPORT TABLE

MEASURED DEPTH m	INC deg	ANN OD mm	PIPE OD mm	JOINT OD mm	MINIMUM FLOW RATE m3/min	CUTTINGS TOTAL %	CUTTINGS SUSPENDED %	BED HEIGHT mm	EQUIVALENT MUD WEIGHT kg/m3
0.00	0.0	387.35	88.90	122.24	2.2871	18.40	0.73	105.35	1049
30.48	0.0	224.41	88.90	122.24	0.8996	0.73	0.73	0.00	1049
60.96	0.0	224.41	88.90	122.24	0.8996	0.73	0.73	0.00	1049
91.44	0.0	224.41	88.90	122.24	0.8996	0.73	0.73	0.00	1049
121.92	0.0	224.41	88.90	122.24	0.8996	0.73	0.73	0.00	1049
152.40	0.0	224.41	88.90	122.24	0.8996	0.73	0.73	0.00	1049
182.88	0.0	224.41	88.90	122.24	0.8996	0.73	0.73	0.00	1049
213.36	0.0	224.41	88.90	122.24	0.8996	0.73	0.73	0.00	1049
243.84	0.0	224.41	88.90	122.24	0.8996	0.73	0.73	0.00	1049
274.32	0.0	224.41	88.90	122.24	0.8996	0.73	0.73	0.00	1049
304.80	0.0	224.41	88.90	122.24	0.8996	0.73	0.73	0.00	1049
335.28	0.0	224.41	88.90	122.24	0.8996	0.73	0.73	0.00	1049
365.76	0.0	224.41	88.90	122.24	0.8996	0.73	0.73	0.00	1049
396.24	0.0	224.41	88.90	122.24	0.8996	0.73	0.73	0.00	1049
426.72	0.0	224.41	88.90	122.24	0.8996	0.73	0.73	0.00	1049
457.20	0.0	224.41	88.90	122.24	0.8996	0.73	0.73	0.00	1049
487.68	0.0	224.41	88.90	122.24	0.8996	0.73	0.73	0.00	1049
518.16	0.0	224.41	88.90	122.24	0.8996	0.73	0.73	0.00	1049
548.64	0.0	224.41	88.90	122.24	0.8996	0.73	0.73	0.00	1049
579.12	0.0	224.41	88.90	122.24	0.8996	0.73	0.73	0.00	1049
609.60	0.0	224.41	88.90	122.24	0.8996	0.73	0.73	0.00	1049
640.08	0.0	224.41	88.90	122.24	0.8996	0.73	0.73	0.00	1049
670.56	0.0	224.41	88.90	122.24	0.8996	0.73	0.73	0.00	1049
701.04	0.0	224.41	88.90	122.24	0.8996	0.73	0.73	0.00	1049
731.52	0.0	224.41	88.90	122.24	0.8996	0.73	0.73	0.00	1049
762.00	0.0	224.41	88.90	122.24	0.8996	0.73	0.73	0.00	1049
792.48	0.0	224.41	88.90	122.24	0.8996	0.73	0.73	0.00	1049
822.96	0.0	224.41	88.90	122.24	0.8996	0.73	0.73	0.00	1049
853.44	0.0	224.41	88.90	122.24	0.8996	0.73	0.73	0.00	1049
883.92	0.0	224.41	88.90	122.24	0.8996	0.73	0.73	0.00	1049
914.40	0.0	224.41	88.90	122.24	0.8996	0.73	0.73	0.00	1049
944.88	0.0	224.41	88.90	122.24	0.8996	0.73	0.73	0.00	1049
975.36	0.0	157.07	88.90	122.24	0.3906	0.73	0.73	0.00	1049
1005.84	0.0	157.07	88.90	122.24	0.3906	0.73	0.73	0.00	1049
1036.32	0.0	157.07	88.90	122.24	0.3906	0.73	0.73	0.00	1049
1066.80	0.0	157.07	88.90	122.24	0.3906	0.73	0.73	0.00	1049
1097.28	0.0	157.07	88.90	122.24	0.3906	0.73	0.73	0.00	1049
1127.76	0.0	157.07	88.90	122.24	0.3906	0.73	0.73	0.00	1049
1158.24	0.0	157.07	88.90	122.24	0.3906	0.73	0.73	0.00	1049
1188.72	0.0	157.07	88.90	122.24	0.3906	0.73	0.73	0.00	1049
1219.20	1.9	157.07	88.90	122.24	0.4048	0.73	0.73	0.00	1049

GNPOC
Hole Cleaning

Case Name:	Case1	**Date:** 15/10/2016	**Time:** 12:00:52	**Page:**	3
Description:	Side Tracking				
Well Name:	Side Tracking	**Project Name:**	Horizontal Drilling		
Well Description:	Horizontal	**Project Description:**	Side Tracking		

CUTTINGS TRANSPORT TABLE

MEASURED DEPTH	INC	ANN OD	PIPE OD	JOINT OD	MINIMUM FLOW RATE	CUTTINGS TOTAL	CUTTINGS SUSPENDED	BED HEIGHT	EQUIVALENT MUD WEIGHT
m	deg	mm	mm	mm	m3/min	%	%	mm	kg/m3
1249.68	5.0	157.07	88.90	122.24	0.4273	0.73	0.73	0.00	1049
1280.16	8.0	157.07	88.90	122.24	0.4496	0.73	0.73	0.00	1049
1310.64	11.1	157.07	88.90	122.24	0.4723	0.73	0.73	0.00	1049
1341.12	14.1	157.07	88.90	122.24	0.4947	0.73	0.73	0.00	1049
1371.60	17.2	157.07	88.90	122.24	0.5172	0.73	0.73	0.00	1049
1402.08	20.2	157.07	88.90	122.24	0.5397	0.73	0.73	0.00	1049
1432.56	23.3	157.07	88.90	122.24	0.5622	0.73	0.73	0.00	1049
1463.04	26.3	157.07	88.90	122.24	0.5847	0.73	0.73	0.00	1049
1493.52	29.4	157.07	88.90	122.24	0.6072	0.73	0.73	0.00	1049
1524.00	32.4	157.07	88.90	122.24	0.6436	0.73	0.73	0.00	1049
1554.48	35.4	157.07	88.90	122.24	0.6805	0.73	0.73	0.00	1049
1584.96	38.5	157.07	88.90	122.24	0.7155	0.73	0.73	0.00	1049
1615.44	41.5	157.07	88.90	122.24	0.7486	0.73	0.73	0.00	1049
1645.92	44.2	157.07	88.90	122.24	0.7763	0.73	0.73	0.00	1049
1676.40	44.2	157.07	88.90	122.24	0.7763	0.73	0.73	0.00	1049
1706.88	44.2	157.07	88.90	120.65	0.7763	0.73	0.73	0.00	1049
1737.36	44.2	157.07	88.90	120.65	0.7763	0.73	0.73	0.00	1049
1767.84	44.2	157.07	88.90	120.65	0.7763	0.73	0.73	0.00	1049
1798.32	44.2	157.07	88.90	120.65	0.7763	0.73	0.73	0.00	1049
1828.80	44.2	157.07	88.90	120.65	0.7763	0.73	0.73	0.00	1049
1859.28	44.2	157.07	88.90	120.65	0.7763	0.73	0.73	0.00	1049
1889.76	44.2	157.07	88.90	120.65	0.7763	0.73	0.73	0.00	1049
1920.24	44.2	157.07	88.90	120.65	0.7763	0.73	0.73	0.00	1049
1950.72	44.2	157.07	120.65	0.00	0.4683	0.73	0.73	0.00	1049
1981.20	44.2	157.07	120.65	0.00	0.4683	0.73	0.73	0.00	1049
2011.68	44.2	157.07	120.65	0.00	0.4683	0.73	0.73	0.00	1049
2042.16	44.2	157.07	120.65	0.00	0.4683	0.73	0.73	0.00	1049
2061.61	44.2	157.07	120.65	0.00	0.4683	0.73	0.73	0.00	1049

MINIMUM FLOW RATE vs. ROP

ROP	88.90 mm DP in 387.35 mm CAS	88.90 mm DP in 224.41 mm CAS	88.90 mm DP in 157.07 mm CAS
m/hr	m3/min	m3/min	m3/min
0.00	2.2871	0.8996	0.6409
3.05	2.2871	0.8996	0.6630
6.10	2.2871	0.8996	0.6838
9.14	2.2871	0.8996	0.7034
12.19	2.2871	0.8996	0.7220
15.24	2.2871	0.8996	0.7397
18.29	2.2871	0.8996	0.7566
21.34	2.2871	0.8996	0.7729
24.38	2.2871	0.8996	0.7886
27.43	2.2871	0.8996	0.8038
30.48	2.2871	0.8996	0.8185
33.53	2.2871	0.8996	0.8327
36.58	2.2871	0.8996	0.8465
39.62	2.2871	0.8996	0.8600
42.67	2.2871	0.8996	0.8730
45.72	2.2871	0.8996	0.8858
48.77	2.2871	0.8996	0.8983
51.82	2.2871	0.8996	0.9105
54.86	2.2871	0.8996	0.9224
57.91	2.2871	0.8996	0.9341
60.96	2.2871	0.8996	0.9455
64.01	2.2871	0.8996	0.9568
67.06	2.2871	0.8996	0.9678
70.10	2.2871	0.8996	0.9786
73.15	2.2871	0.8996	0.9892
76.20	2.2871	0.8996	0.9997
79.25	2.2871	0.8996	1.0100
82.30	2.2871	0.8996	1.0201
85.34	2.2871	0.8996	1.0301
88.39	2.2871	0.8996	1.0398
91.44	2.2871	0.8996	1.0495
94.49	2.2871	0.8996	1.0590
97.54	2.2871	0.8996	1.0684
100.58	2.2871	0.8996	1.0777
103.63	2.2871	0.8996	1.0869

GNPOC

Bottom Hole Assembly Report (Drillahead)

Case Name:	Case1	**Date:** 15/10/2016	**Time:** 12:08:46	**Page:**	1
Description:	Side Tracking				
Well Name:	Side Tracking	**Project Name:**	Horizontal Drilling		
Well Description:	Horizontal	**Project Description:**	Side Tracking		

DRILLING PARAMETERS OUTPUT

MUD WEIGHT	1038 kg/m3
TORQUE AT BIT	1355.8 N-m
MEASURED DEPTH	2061.61 m
ROTARY SPEED	100 rpm
DRILLAHEAD INTERVAL	3.048 m
BIT COEFFICIENT	50
WELLBORE OVERGAUGE	12.70 mm
FORMATION HARDNESS FACTOR	30

WEIGHT ON BIT STUDY REPORT

WEIGHT ON BIT kN	RATE OF PENETRATION m/hr	BUILD RATE deg/30m	WALK RATE deg/30m

DRILLSTRING

	<-------- LENGTH -------->		<--BODY-->		<---- STABILIZER / TOOL JOINT ---->						
TYPE	**COMPONENT** m	**TOTAL** m	**OD** mm	**ID** mm	**LENGTH** m	**OD** mm	**ID** mm	**FISHNECK** m	**WEIGHT** kg/m	**MTL GRADE**	**CLASS***
DP	1684.871	1684.871	88.90	70.21		122.24	53.98		21.86	CS_API 5D/7 S	P
HW	246.888	1931.759	88.90	57.15		120.65	58.75		34.53	CS_1340 MOD 1340 MOD	
JAR	9.754	1941.513	120.65	57.15					69.62	CS_API 5D/7 4145H MOD (1)	
DC	91.440	2032.953	120.65	57.15					69.60	CS_API 5D/7 4145H MOD (1)	
DC	9.150	2042.103	120.65	57.15					69.60	CS_API 5D/7 4145H MOD (1)	
MWD	9.144	2051.247	120.65	40.64					85.67	SS_15-15LC 15-15LC MOD (1)	
BS	0.914	2052.161	112.78	36.58					71.60	CS_API 5D/7 4145H MOD (1)	
BHM	9.144	2061.305	120.65	44.45					77.56	CS_API 5D/7 4145H MOD (1)	1
BIT	0.305	2061.610	152.40						52.09		

GNPOC

Bottom Hole Assembly Report (Drillahead)

Case Name:	Case1	**Date:**	15/10/2016	**Time:**	12:08:46	**Page:**	2
Description:	Side Tracking						
Well Name:	Side Tracking	**Project Name:**	Horizontal Drilling				
Well Description:	Horizontal	**Project Description:**	Side Tracking				

WELLBORE

TYPE	SECTION DEPTH m	SECTION LENGTH m	EFFECTIVE INSIDE DIAMETER mm	COEFFICIENT OF FRICTION	VOLUME EXCESS %
CAS	30.00	30.000	387.35	0.25	
CAS	962.00	932.000	224.41	0.25	
CAS	1200.00	238.000	157.07	0.25	
OH	2061.61	861.610	157.07	0.30	

Survey **Tortuosity: None** **Calculation Method: Minimum Curvature**

Md m	Incl deg	Direc deg	Tvd m	Build deg/30m	Walk deg/30m	Dls deg/30m
0.00	0.00	238.90	0.00	0.000	0.000	0.000
1200.00	0.00	238.90	1200.00	0.000	0.000	0.000
1230.00	3.00	238.90	1229.99	3.000	0.000	3.000
1260.00	6.00	238.90	1259.89	3.000	0.000	3.000
1290.00	9.00	238.90	1289.63	3.000	0.000	3.000
1320.00	12.00	238.90	1319.12	3.000	0.000	3.000
1350.00	15.00	238.90	1348.29	3.000	0.000	3.000
1380.00	18.00	238.90	1377.05	3.000	0.000	3.000
1410.00	21.00	238.90	1405.33	3.000	0.000	3.000
1440.00	24.00	238.90	1433.04	3.000	0.000	3.000
1470.00	27.00	238.90	1460.12	3.000	0.000	3.000
1500.00	30.00	238.90	1486.48	3.000	0.000	3.000
1530.00	33.00	238.90	1512.06	3.000	0.000	3.000
1560.00	36.00	238.90	1536.78	3.000	0.000	3.000
1590.00	39.00	238.90	1560.57	3.000	0.000	3.000
1620.00	42.00	238.90	1583.36	3.000	0.000	3.000
1642.50	44.25	238.90	1599.80	3.000	0.000	3.000
1672.50	44.25	238.90	1621.29	0.000	0.000	0.000
1702.50	44.25	238.90	1642.78	0.000	0.000	0.000
1732.50	44.25	238.90	1664.27	0.000	0.000	0.000
1762.50	44.25	238.90	1685.76	0.000	0.000	0.000
1792.50	44.25	238.90	1707.25	0.000	0.000	0.000
1822.50	44.25	238.90	1728.74	0.000	0.000	0.000
1852.50	44.25	238.90	1750.23	0.000	0.000	0.000
1882.50	44.25	238.90	1771.72	0.000	0.000	0.000
1912.50	44.25	238.90	1793.21	0.000	0.000	0.000
1942.50	44.25	238.90	1814.70	0.000	0.000	0.000
1972.50	44.25	238.90	1836.18	0.000	0.000	0.000
2002.50	44.25	238.90	1857.67	0.000	0.000	0.000
2032.50	44.25	238.90	1879.16	0.000	0.000	0.000
2061.61	44.25	238.90	1900.01	0.000	0.000	0.000
0.00	0.00	0.00	0.00	0.000	0.000	0.000
0.00	0.00	0.00	0.00	0.000	0.000	0.000
0.00	0.00	0.00	0.00	0.000	0.000	0.000
0.00	0.00	0.00	0.00	0.000	0.000	0.000
0.00	0.00	0.00	0.00	0.000	0.000	0.000
0.00	0.00	0.00	0.00	0.000	0.000	0.000
0.00	0.00	0.00	0.00	0.000	0.000	0.000
0.00	0.00	0.00	0.00	0.000	0.000	0.000
0.00	0.00	0.00	0.00	0.000	0.000	0.000
0.00	0.00	0.00	0.00	0.000	0.000	0.000
0.00	0.00	0.00	0.00	0.000	0.000	0.000
0.00	0.00	0.00	0.00	0.000	0.000	0.000
0.00	0.00	0.00	0.00	0.000	0.000	0.000
0.00	0.00	0.00	0.00	0.000	0.000	0.000
0.00	0.00	0.00	0.00	0.000	0.000	0.000
0.00	0.00	0.00	0.00	0.000	0.000	0.000
0.00	0.00	0.00	0.00	0.000	0.000	0.000
0.00	0.00	0.00	0.00	0.000	0.000	0.000
0.00	0.00	0.00	0.00	0.000	0.000	0.000
0.00	0.00	0.00	0.00	0.000	0.000	0.000
0.00	0.00	0.00	0.00	0.000	0.000	0.000
0.00	0.00	0.00	0.00	0.000	0.000	0.000
0.00	0.00	0.00	0.00	0.000	0.000	0.000
0.00	0.00	0.00	0.00	0.000	0.000	0.000
0.00	0.00	0.00	0.00	0.000	0.000	0.000
0.00	0.00	0.00	0.00	0.000	0.000	0.000
0.00	0.00	0.00	0.00	0.000	0.000	0.000
0.00	0.00	0.00	0.00	0.000	0.000	0.000

GNPOC

Bottom Hole Assembly Report (Drillahead)

Case Name:	Case1	**Date:**	15/10/2016	**Time:**	12:08:46	**Page:**	3
Description:	Side Tracking						
Well Name:	Side Tracking	**Project Name:**	Horizontal Drilling				
Well Description:	Horizontal	**Project Description:**	Side Tracking				

Survey **Tortuosity: None** **Calculation Method: Minimum Curvature**

Md m	**Incl** deg	**Direc** deg	**Tvd** m	**Build** deg/30m	**Walk** deg/30m	**Dls** deg/30m
0.00	0.00	0.00	0.00	0.000	0.000	0.000
0.00	0.00	0.00	0.00	0.000	0.000	0.000
0.00	0.00	0.00	0.00	0.000	0.000	0.000
0.00	0.00	0.00	0.00	0.000	0.000	0.000
0.00	0.00	0.00	0.00	0.000	0.000	0.000
0.00	0.00	0.00	0.00	0.000	0.000	0.000
0.00	0.00	0.00	0.00	0.000	0.000	0.000
0.00	0.00	0.00	0.00	0.000	0.000	0.000
0.00	0.00	0.00	0.00	0.000	0.000	0.000
0.00	0.00	0.00	0.00	0.000	0.000	0.000
0.00	0.00	0.00	0.00	0.000	0.000	0.000
0.00	0.00	0.00	0.00	0.000	0.000	0.000

RESULTS AT THE BIT (+ IS UP/RIGHT, - IS DOWN/LEFT)

	WELLBORE deg	**STRING** deg	**TILT** deg	**FORCE** kgf
INCLINATION				
DIRECTION				

BHA FORCES

MEASURED DEPTH m	**DISTANCE FROM BIT** m	**TYPE**	**CONTACT**	**|<-----------------CONTACT FORCES--------------->|**			**AXIAL FORCE** kgf	**TORQUE** N-m
				INCLINATION kgf	**DIRECTION** kgf	**RESULTANT** kgf		
	0.00					5252.9		
	0.73					25731.6		
	1.46					1859.2		
	2.19					38609.1		
	2.93					26832.4		
	3.66					133003.4		
	5.59					81404.6		
	7.52					2243.7		
	9.45					2496.3		
	10.36					2528.9		
	12.65					1064.3		
	14.94					1797.1		
	17.22					0.0		
	19.51					0.0		
	21.79					0.0		
	24.08					1294.5		
	26.37					1258.7		
	28.66					1827.7		
	31.06					2385.6		
	33.47					0.0		
	35.88					1708.6		
	38.28					1173.3		
	40.69					1126.5		
	43.09					1051.4		
	45.50					834.1		
	47.91					1945.2		
	50.31					1213.7		
	52.72					0.0		
	55.13					1117.3		
	57.53					820.5		
	59.94					1057.8		
	62.35					1011.8		
	64.75					753.0		
	67.16					1613.9		
	69.56					883.4		
	71.97					1474.2		
	74.38					2043.4		
	76.78					0.0		
	79.19					5656.6		
	81.60					51.6		

GNPOC

Bottom Hole Assembly Report (Drillahead)

Case Name:	Case1	**Date:** 15/10/2016	**Time:** 12:08:46	**Page:**	4
Description:	Side Tracking				
Well Name:	Side Tracking	**Project Name:**	Horizontal Drilling		
Well Description:	Horizontal	**Project Description:**	Side Tracking		

BHA DISPLACEMENTS

MEASURED DEPTH m	DISTANCE FROM BIT m	TYPE	DISPLACEMENT FROM WELL CENTERLINE INCLINATION mm	DIRECTION mm	RESULTANT mm	CLEARANCE mm
	0.00					
	0.73					
	1.46					
	2.19					
	2.93					
	3.66					
	5.59					
	7.52					
	9.45					
	10.36					
	12.65					
	14.94					
	17.22					
	19.51					
	21.79					
	24.08					
	26.37					
	28.66					
	31.06					
	33.47					
	35.88					
	38.28					
	40.69					
	43.09					
	45.50					
	47.91					
	50.31					
	52.72					
	55.13					
	57.53					
	59.94					
	62.35					
	64.75					
	67.16					
	69.56					
	71.97					
	74.38					
	76.78					
	79.19					
	81.60					

ELEMENT FORCES TABLE

ELEMENT	NODE	FX kgf	FY kgf	FZ kgf	MX N-m	MY N-m	MZ N-m

Appendix B: Code of Wellbore Stability Program

1. Code of Fraction Pressure Model:

```
format shortg
D=str2double(get(handles.d,'string'));
Pf=str2double(get(handles.pf,'string'));
Vv=str2double(get(handles.v1,'string'));
VH=str2double(get(handles.v2,'string'));
Vh=str2double(get(handles.v3,'string'));
So=str2double(get(handles.so,'string'));
Fa=str2double(get(handles.fa,'string'));
V=str2double(get(handles.v,'string'));
P=str2double(get(handles.p,'string'));
B=str2double(get(handles.b,'string'));
L=str2double(get(handles.a,'string'));
tab=str2double(get(handles.minc,'data'));
Ia=tab(:,2);
Mw=tab(:,1);
for i=1:length(Ia)
    if isnan(Ia(i)==1)
        Ia(i)=0;
        Mw(i)=0;
    end

end
  Ia=Ia(Ia>0);
    Mw=Mw(Mw>0);
for i=1:length(Ia)
Nx(i)=((VH*((cos(B/57.3))^2))+(Vh*((sin(B/57.3))^2)))*((cos
(Ia(i)/57.3))^2)+(Vv*((sin(Ia(i)/57.3))^2));
Ny(i)=((VH*((sin(B/57.3))^2))+(Vh*((cos(B/57.3))^2)));
```

```
Nz(i)=((VH*((cos(B/57.3))^2))+(Vh*((sin(B/57.3))^2)))*((sin
(Ia(i)/57.3))^2)+(Vv*((cos(Ia(i)/57.3))^2));
Nxy(i)=(-0.5)*((VH)-
(Vh))*(sin((2*B)/57.3))*(cos(Ia(i)/57.3))
Nyz(i)=(0.5)*((VH)-
(Vh))*(sin((2*B)/57.3))*(sin(Ia(i)/57.3));
Nxz(i)=(-
0.5)*((VH*((cos(B/57.3))^2))+(Vh*((sin(B/57.3))^2))-
(Vv))*(sin((2*Ia(i))/57.3));
Pw(i)=(0.052)*((Mw(i)))*(D);
Rr(i)=(Pw(i));
Ls(i)=((Nx(i))+(Ny(i))-(Pw(i)))-(2*((Nx(i))-
(Ny(i)))*((cos((2*L)/57.3))))-
(4*(Nxy(i))*(sin((2*L)/57.3)));
Aa(i)=(Nz(i))-(2*(V)*((Nx(i))-(Ny(i)))*(cos((2*L)/57.3)))-
(4*(V)*(Nxy(i))*(sin((2*L)/57.3)));
Aa1(i)=(2)*((Nyz(i)*(cos(L/57.3)))-(Nxz(i)*(sin(L/57.3))));
Aa2(i)=0;
Aa3(i)=0;
Pfrac(i)=(((Ls(i))+(Aa(i)))/2)-(sqrt((((Ls(i))-
(Aa(i)))/2)^2+Aa1(i)^2))+(abs(So));
Fg(i)=((Pfrac(i))/((0.052)*(D)))
end
tab2=Pfrac';
set(handles.out,'data',tab2);
abc=guidata(well21);

a=[Nx;Ny;Nz;Nxy;Nyz;Nxz;Pw;Rr;Ls;Aa;Aa1;Aa2;Aa3;Pfrac;Fg]'
  set(abc.results,'data',a)
```

2. Code of Mohr-Coulomb Collapse Model:

```
D=str2double(get(handles.d,'string'));
Pf=str2double(get(handles.pf,'string'));
Vv=str2double(get(handles.v1,'string'));
VH=str2double(get(handles.v2,'string'));
Vh=str2double(get(handles.v3,'string'));
So=str2double(get(handles.so,'string'));
Fa=str2double(get(handles.fa,'string'));
V=str2double(get(handles.v,'string'));
P=str2double(get(handles.p,'string'));
B=str2double(get(handles.b,'string'));
L=str2double(get(handles.a,'string'));
tab=str2double(get(handles.minc,'data'));
Ia=tab(:,2);
Mw=tab(:,1);
for i=1:length(Ia)
    if isnan(Ia(i)==1)
        Ia(i)=0;
        Mw(i)=0;
    end

end
  Ia=Ia(Ia>0);
    Mw=Mw(Mw>0);
for i=1:length(Ia)
Nx(i)=((VH*((cos(B/57.3))^2))+(Vh*((sin(B/57.3))^2)))*((cos
(Ia(i)/57.3))^2)+(Vv*((sin(Ia(i)/57.3))^2));
Ny(i)=((VH*((sin(B/57.3))^2))+(Vh*((cos(B/57.3))^2)));
Nz(i)=((VH*((cos(B/57.3))^2))+(Vh*((sin(B/57.3))^2)))*((sin
(Ia(i)/57.3))^2)+(Vv*((cos(Ia(i)/57.3))^2));
```

```
Nxy(i)=(-0.5)*((VH)-
(Vh))*(sin((2*B)/57.3))*(cos(Ia(i)/57.3));
Nyz(i)=(0.5)*((VH)-
(Vh))*(sin((2*B)/57.3))*(sin(Ia(i)/57.3));
Nxz(i)=(-
0.5)*((VH*((cos(B/57.3))^2))+(Vh*((sin(B/57.3))^2))-
(Vv))*(sin((2*Ia(i))/57.3));
Pw(i)=(0.052)*(Mw(i))*(D);
Rr(i)=(Pw(i));
Ls(i)=((Nx(i))+(Ny(i))-(Pw(i)))-((2)*((Nx(i))-
(Ny(i)))*(cos((2*L)/57.3)))-
((4)*(Nxy(i))*(sin((2*L)/57.3)));
Aa(i)=(Nz(i))-((2)*(V)*((Nx(i))-
(Ny(i)))*(cos((2*L)/57.3)))-
((4)*(V)*(Nxy(i))*(sin((2*L)/57.3)));
Aa1(i)=(2)*((Nyz(i)*(cos(L/57.3)))-(Nxz(i)*(sin(L/57.3))));
Aa2(i)=0;
Aa3(i)=0;
P1(i)=((Ls(i)+Aa(i))/2)+(sqrt(((Ls(i)-
Aa(i))/2)^2)+(Aa1(i))^2));
P2(i)=((Ls(i)+Aa(i))/2)-(sqrt(((Ls(i)-
Aa(i))/2)^2)+(Aa1(i))^2));
P3(i)=(Rr(i));
M=[P1(i) P2(i) P3(i)];
Mmax(i)=max(M);
Mmin(i)=min(M);
Emax(i)=Mmax(i)-(P*Pf);
Emin(i)=Mmin(i)-(P*Pf);
Nf(i)=(2)*(So)*(tan(((pi+2*Fa)/4)/57.3))+(Emin(i)*((tan(((p
i+2*Fa)/4)/57.3))^2));
aaa(i)=((Emax(i))/(Nf(i)));
end
```

```
tab2=Nf';
set(handles.out,'data',tab2);
abc=guidata(well31);

a=[Nx;Ny;Nz;Nxy;Nyz;Nxz;Pw;Rr;Ls;Aa;Aa1;Aa2;Aa3;P1;P2;P3;Mm
ax;Mmin;Emax;Emin;Nf;aaa]';
  set(abc.results,'data',a);
```