



Maurer Technology Inc.

DRILLRISER V 1.0

Drilling Riser Wear Model

For Windows 95, 98, 2000 and NT

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DRILLRISER [Minimize] [Maximize] [Close]

File Edit View Options Utilities Window Help

[New] [Open] [Save] [Print] [Previous] [Next] [Tools] [Layers] [Help] [About]

Data File - C:\LEE\WB5\DrillRiser\DRTest.DR1 [Close]

Project Survey Tubulars Wellbore Operation W. Factor

Well:

Project:

Company:

Field:

Location:

Date:

Comments:

Operating Mode

Drill Redrill

Ream Upward Rotate Off Bottom

C:\LEE\WB5\DrillRiser\DRTest.DR1 | Units: English | 15.10.02 | 8:09



Data File - C:\LEE\WB5\DrillRiser\DRTest.DR1

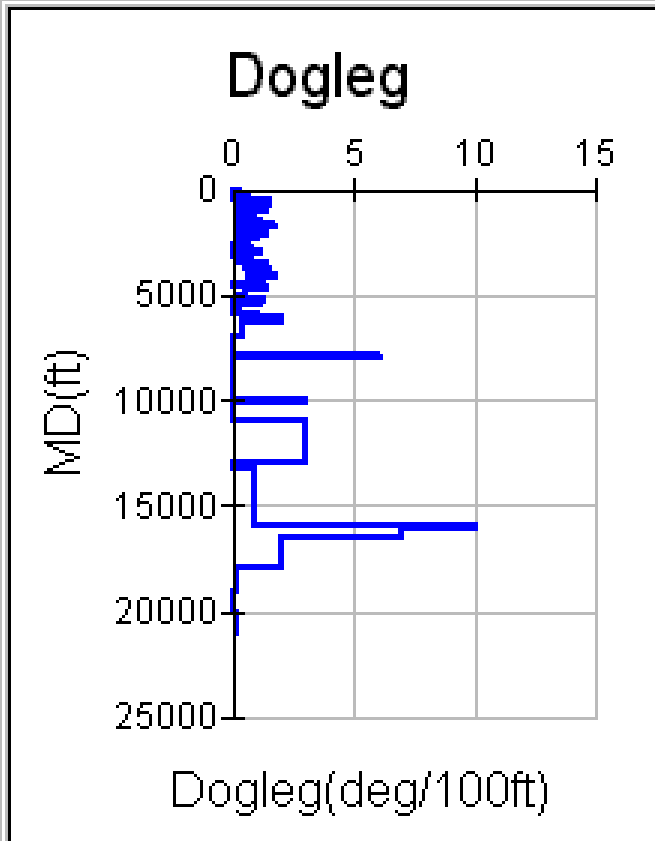
Project
 Survey
 Tubulars
 Wellbore
 Operation
 W. Factor

Survey File: _____

Inclination **Azimuth**
 Decimal Deg:Min
 Angular Oil Field

	MD (ft)	Inclination (deg)	Azimuth (deg)	TVD (ft)	Dogleg (deg/100ft)
1	0.0	0.41	0.41	0.0	0.00
2	100.0	0.07	0.07	100.0	0.34
3	200.0	0.16	0.16	200.0	0.09
4	300.0	0.42	179.58	300.0	0.58
5	400.0	0.40	179.60	400.0	0.02
6	500.0	0.55	0.55	500.0	0.95
7	600.0	0.97	179.03	600.0	1.52
8	700.0	0.52	0.52	700.0	1.49
9	800.0	0.63	0.63	800.0	0.11
10	900.0	0.42	0.42	900.0	0.21

Warn if dogleg >=





Project
 Survey
 Tubulars
 Wellbore
 Operation
 W. Factor

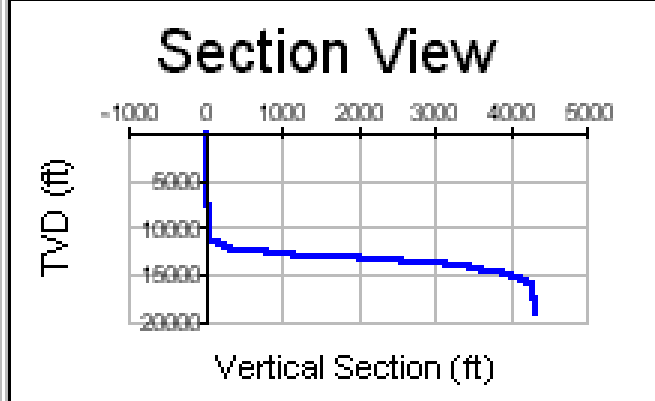
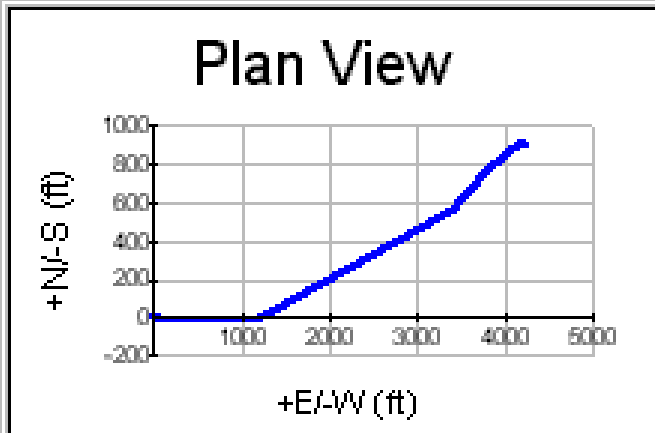
Survey File: [Text Box]

Inclination
 Decimal Deg:Min

Azimuth
 Angular Oil Field

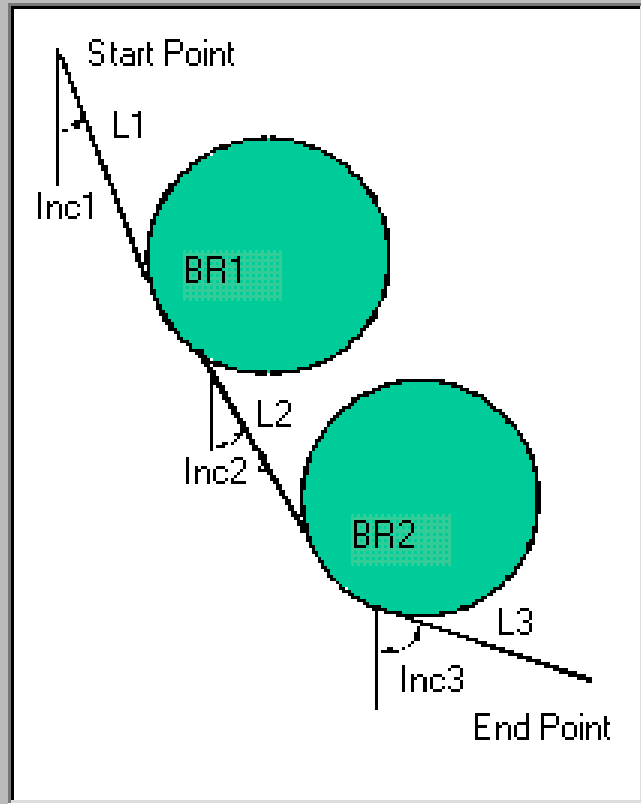
	MD (ft)	Inclination (deg)	Azimuth (deg)	TVD (ft)	Dogleg (deg/100ft)
1	0.0	0.41	0.41	0.0	0.00
2	100.0	0.07	0.07	100.0	0.34
3	200.0	0.16	0.16	200.0	0.09
4	300.0	0.42	179.58	300.0	0.58
5	400.0	0.40	179.60	400.0	0.02
6	500.0	0.55	0.55	500.0	0.95
7	600.0	0.97	179.03	600.0	1.52
8	700.0	0.52	0.52	700.0	1.49
9	800.0	0.63	0.63	800.0	0.11
10	900.0	0.42	0.42	900.0	0.21

Warn if dogleg >=



2D Plan

Build/Build
 Build/Drop
 Build/Hold



Target

TVD/NS/EW
 TVD/Horizontal Distance/Azi

TVD (ft):
 N/S (ft):
 E/W (ft):

Planning

	Unknowns (Select 2)	Value
Inc1 (deg)	<input type="checkbox"/>	0
L1 (KOP) (ft)	<input type="checkbox"/>	2000
BR1 (deg/100ft)	<input type="checkbox"/>	5
Inc2 (deg)	<input checked="" type="checkbox"/>	
L2 (ft)	<input checked="" type="checkbox"/>	
BR2 (deg/100ft)	<input type="checkbox"/>	5
Inc3 (deg)	<input type="checkbox"/>	90
L3 (ft)	<input type="checkbox"/>	2000

Survey Interval

Straight Section (ft):
 Curve Section (ft):

	MD (ft)	Inc (deg)	Azi (deg)	TVD (ft)	N/S (ft)	E/W (ft)	Build Rate (deg/100ft)	Section Length (ft)
1	0.00	0.00	33.69	0.0	0.0	0.0	n/a	n/a
2	2000.0	0.00	33.69	2000.0	0.0	0.0	0.00	2000.0
3	2278.5	13.92	33.69	2275.7	28.0	18.7	5.00	278.5
4	4188.7	13.92	33.69	4129.8	410.5	273.6	0.00	1910.2
5	5710.2	90.00	33.69	5000.0	4160.3	2773.5	5.00	1521.5
6	7710.2	90.00	33.69	5000.0	3000.0	2000.0	0.00	2000.0

Calculate

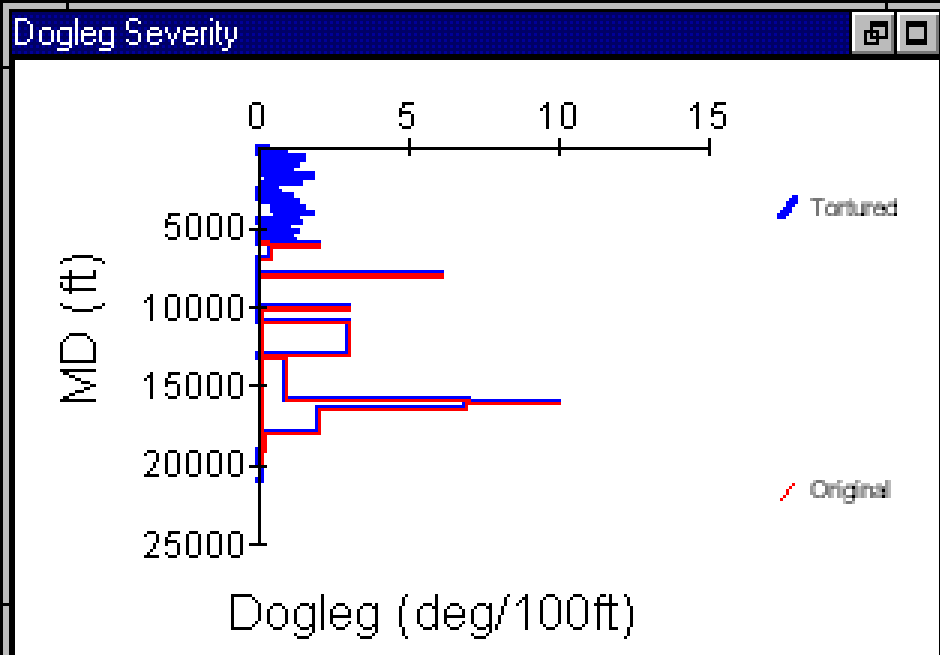
Accept

Cancel

Tortuosity

Survey Data

Tor. Sta.	MD (ft)	Inclination (deg)	Azimuth (deg)	Dogleg (deg/100ft)
1	0.00	0.41	0.41	0.00
2	100.00	0.07	0.07	0.34
3	200.00	0.16	0.16	0.09
4	300.00	0.42	179.58	0.58
5	400.00	0.40	179.60	0.02
6	500.00	0.55	0.55	0.95
7	600.00	0.97	179.03	1.52
8	700.00	0.52	0.52	1.49
9	800.00	0.63	0.63	0.11
10	900.00	0.42	0.42	0.21



Number of Zones (1 to 5):

Method:

Sinusoid

Random

	Bottom MD	Amplitude	Insert Stations	Interval Length
Zone 1:	<input type="text" value="6000"/>	<input type="text" value="1"/>	<input checked="" type="checkbox"/> insert zone 1	<input type="text" value="100"/>
Zone 2:	<input type="text" value="21000.0"/>	<input type="text" value="0"/>	<input checked="" type="checkbox"/> insert zone 2	<input type="text" value="100"/>

-



- Project
- Survey
- Tubulars**
- Wellbore
- Operation
- W. Factor

Drill String (Starting from Bottom)

- Starting from Bottom
- Starting from Top

	Description	Section Length (ft)	Pipe OD (in)	Pipe ID (in)	Adjusted Weight (lb/ft)	Pipe Density (lb/ft ³)
1	Bottom DP	600.0	5.000	2.000	56.000	490.0
2	Middle DP	2000.0	5.000	4.000	28.900	490.0
3	Upper DP	18400.0	5.000	4.276	22.400	490.0
4						
5						

Tool Joint

Tool Joint OD: (in)

Tool Joint Contact Length: (in)

Drill Pipe Joint Length: (ft)

Tubular Database

Pipe Class: DP New

Pipe OD (in): 5.000

- Aluminum DP
- DP Class 2
- DP Class 3
- DP New**
- DP Premium
- Drill Collar
- HWDP

	Class		Pipe ID (in)	Nominal Weight (lb/ft)	Adjusted Weight (lb/ft)	Grade	Upset	Thr
1	DP New		4.276	19.500	20.900	E-75	IEU	XH
2	DP New	5.000	4.276	19.500	22.100	E-75	IEU	5.5FH
3	DP New	5.000	4.000	25.600	26.900	E-75	IEU	XH
4	DP New	5.000	4.000	25.600	28.100	E-75	IEU	5.5FH
5	DP New	5.000	4.276	19.500	21.400	X-95	IEU	XH
6	DP New	5.000	4.276	19.500	22.400	X-95	IEU	5.5FH
7	DP New	5.000	4.000	25.600	27.800	X-95	IEU	XH
8	DP New	5.000	4.000	25.600	28.300	X-95	IEU	5.5FH
9	DP New	5.000	4.276	19.500	21.900	G-105	IEU	XH
10	DP New	5.000	4.276	19.500	22.400	G-105	IEU	5.5FH
11	DP New	5.000	4.000	25.600	28.300	G-105	IEU	XH
12	DP New	5.000	4.000	25.600	28.900	G-105	IEU	5.5FH



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Wellbore (Riser, Casing, Open Hole - input from top)

	Description	Bottom MD (ft)	OD (in)	ID (in)	Yield Strength (psi)	Density (lb/ft ³)	Wear Limit %
1	Riser	5945.0	16.000	15.000	130000	490.0	50.0
2	Center of Rotation	5950.0	30.000	15.000	200000	490.0	50.0
3	Flex Joint	5955.0	30.000	15.000	200000	490.0	50.0
4	BOP	6000.0	16.200	15.000	150000	490.0	50.0
5	Casing	10000.0	13.375	12.347	110000	490.0	62.0

Insert

Delete

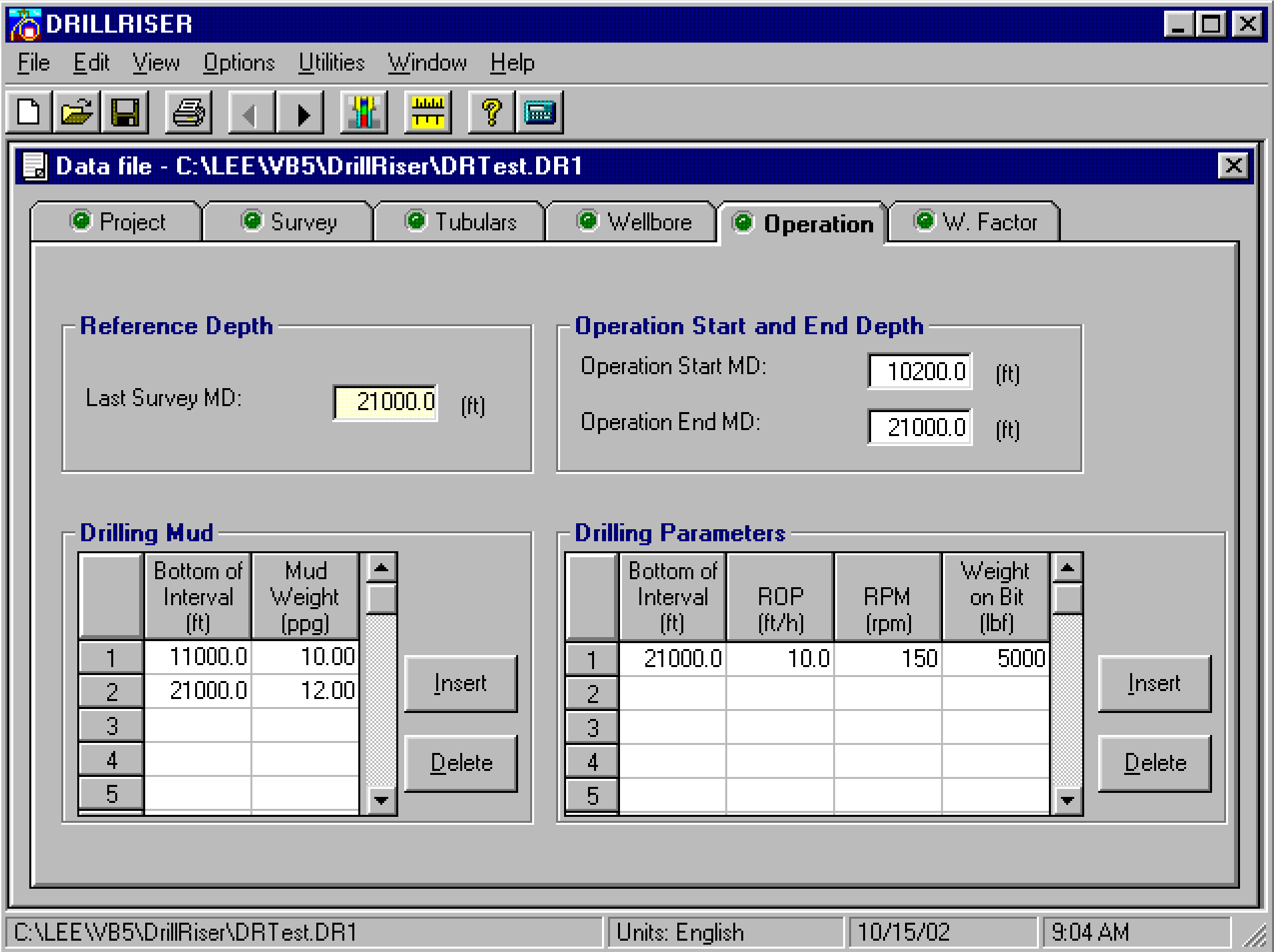
Tubular Data

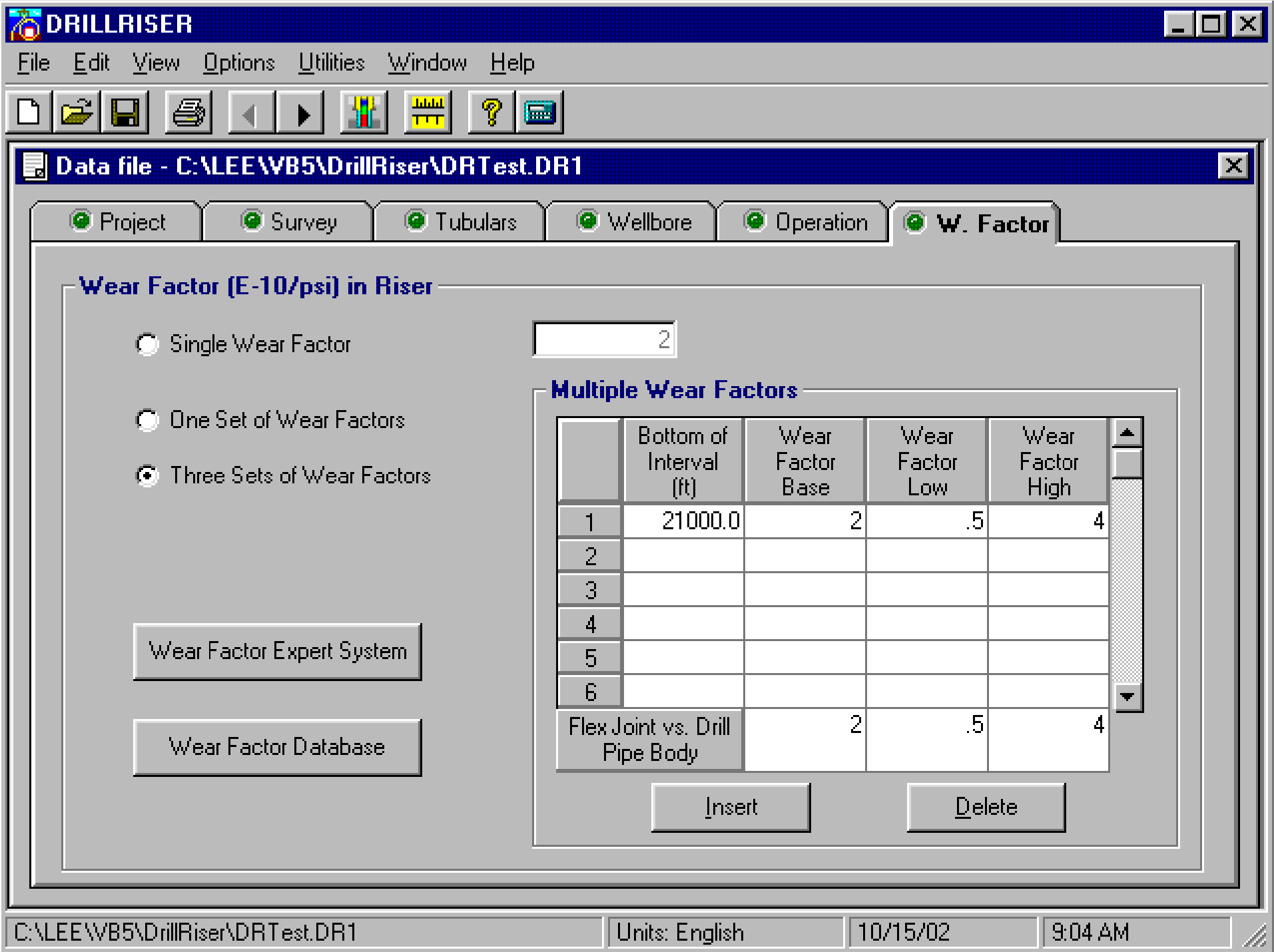
Flex Joint

Offset Angle: (deg)

Burst and Collapse Strength

- Biaxial Stress
- API Equation
- OTS Equation





 **Wear Factor Expert System**



Tool Joint Materials

- Hardmetal
- Rubber Protector (Smooth)
- Steel
- Rubber Protector (Fluted)

Return

Wear Factor Range (E-10/psi): 2 - 13
Suggested (E-10/psi): 7

Drilling Fluids:

- Water Based Mud
- Oil Based Mud
- Water
- Brine
- Air

Additives

- None
- Barite
- Limestone
- Iron Oxide
- HEC Polymer
- XC Polymer

Lubricants

- None
- DL - 100
- EP - Lube
- Torq Trim
- Enviro - Lube
- Drill Beads

Sand Content

- Sand in Mud
- No Sand in Mud

Wear Factor Database

File Help

	Casing Material	Mud Type w/ Additives	Tool Joint	Wear Factor (E-10/psi)
31	N-80	WB+7% Sand	DUOCOR(AMTECH)	2.24
32	N-80	WB+7% Sand	ARMACOR-M(Smooth)	0.6;0.64
33	N-80	WB+2-7% Limestone	S-S	0.67
34	N-80	WB+4% Ironox	S-S	3.70-5.50
35	N-80	WB+2%Sand+3%Barite	S-S	0.8;1.7
36	N-80	WB+2%Sand+2%Lime St	S-S	1.62
37	N-80	WB+2%Sand+5%Barite	S-S	0.67
38	N-80	WB+1%S+20% Barite	S-S	0.51
39	N-80	WB+1%S.+20% Barite	Shell-2 SM-X(Box)	7.62
40	N-80	WB+7%S.+HEC Polymer	S-S	16.7
41	N-80	WB+7%S.+XC Polymer	S-S	4.9
42	N-80	WB+7%S.+6lbs/bbl Wal	S-S	2.21
43	N-80	WB+7%S.+0.6%T.Trim	S-S	2.2;3.7;6.69
44	N-80	WB+7%+0.6%EP Lube	S-S	0.4;0.57
45	N-80	WB+7%S.+EP Lube	S-S	0.9

Insert

Delete

Return



Data file - C:\LEE\WB5\DrillRiser\DRTest.DR1 [Close]

Project
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 W. History

Wear File:

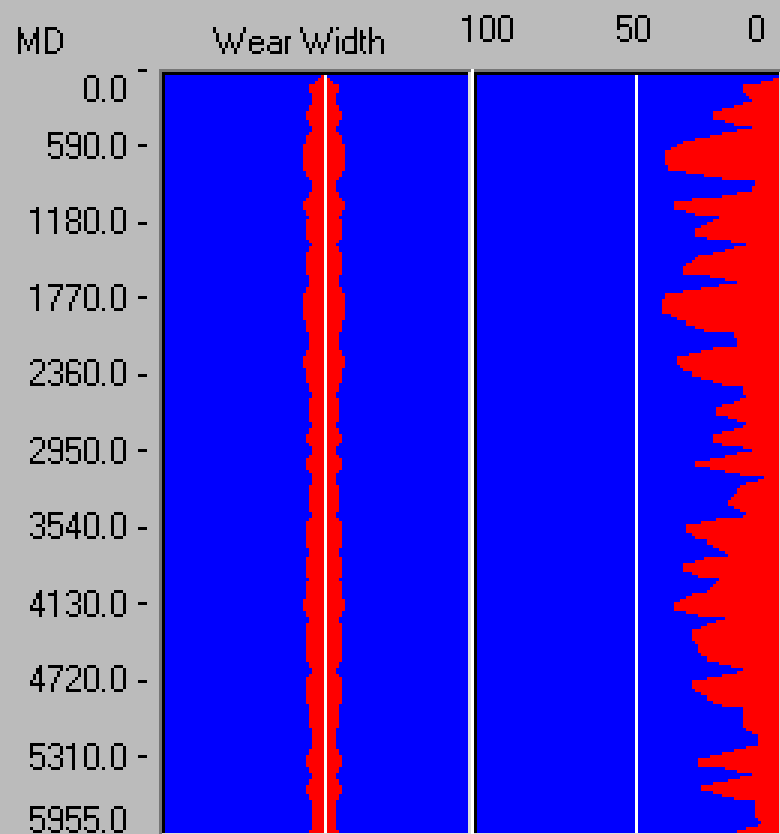
Wear History Data

	MD (ft)	Riser/Casing ID (in)	Wall Thickness (in)	WF Base Rem. Wall (in)
1	0.0	15.000	0.500	0.500
2	100.0	15.000	0.500	0.423
3	200.0	15.000	0.500	0.451
4	300.0	15.000	0.500	0.378
5	400.0	15.000	0.500	0.462
6	500.0	15.000	0.500	0.346
7	600.0	15.000	0.500	0.300
8	700.0	15.000	0.500	0.303
9	800.0	15.000	0.500	0.449

Wear Factor:

Wear Plots

Tool Joint OD= 6.375



Well Schematic - [Well Schematic (Based on MD)]

File View



Well: Sample
Company: Maurer Technology

Field: Houston
Type: Well Schematic (Based on MD)

Center of Flex BOP

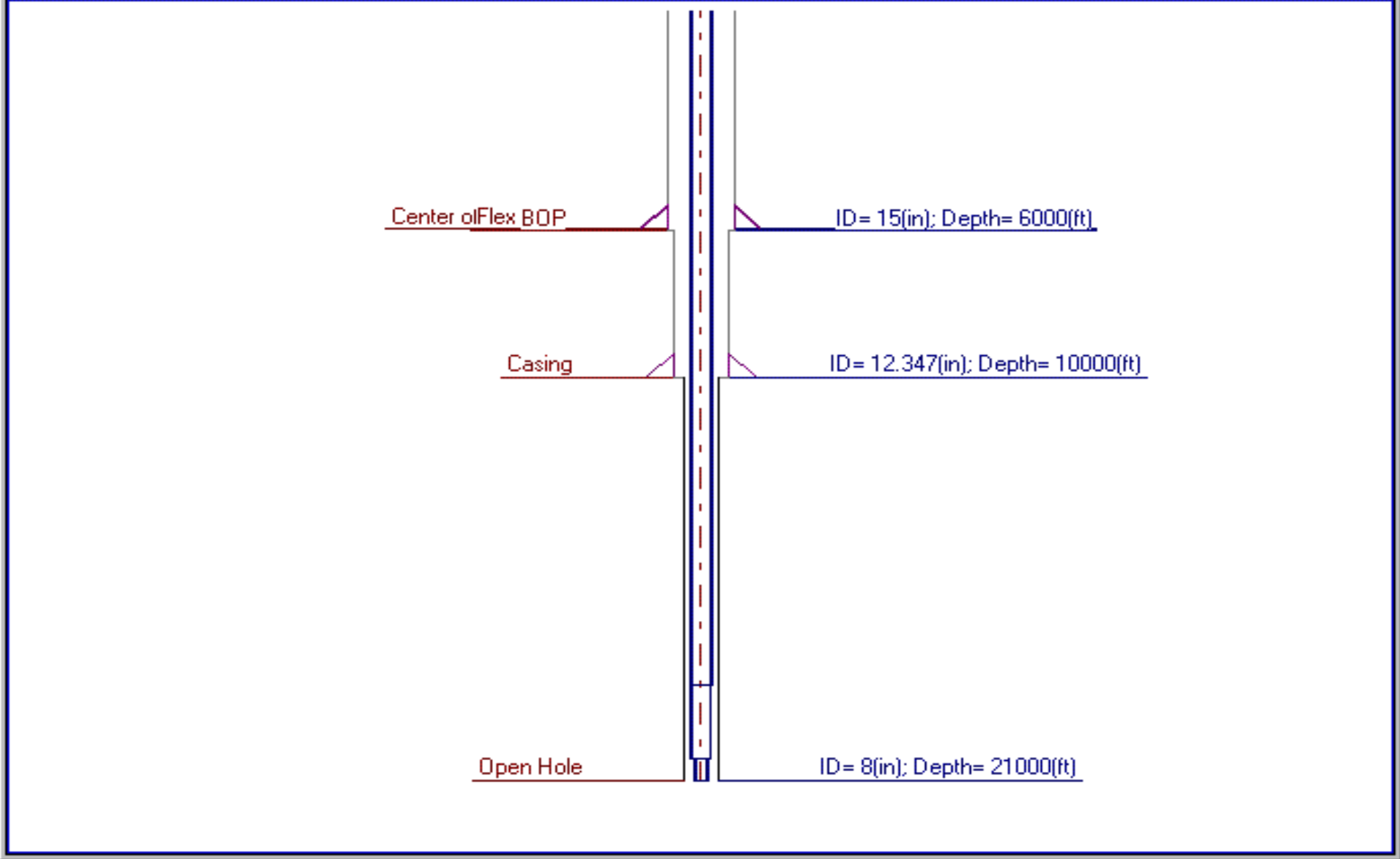
ID= 15(in); Depth= 6000(ft)

Casing

ID= 12.347(in); Depth= 10000(ft)

Open Hole

ID= 8(in); Depth= 21000(ft)



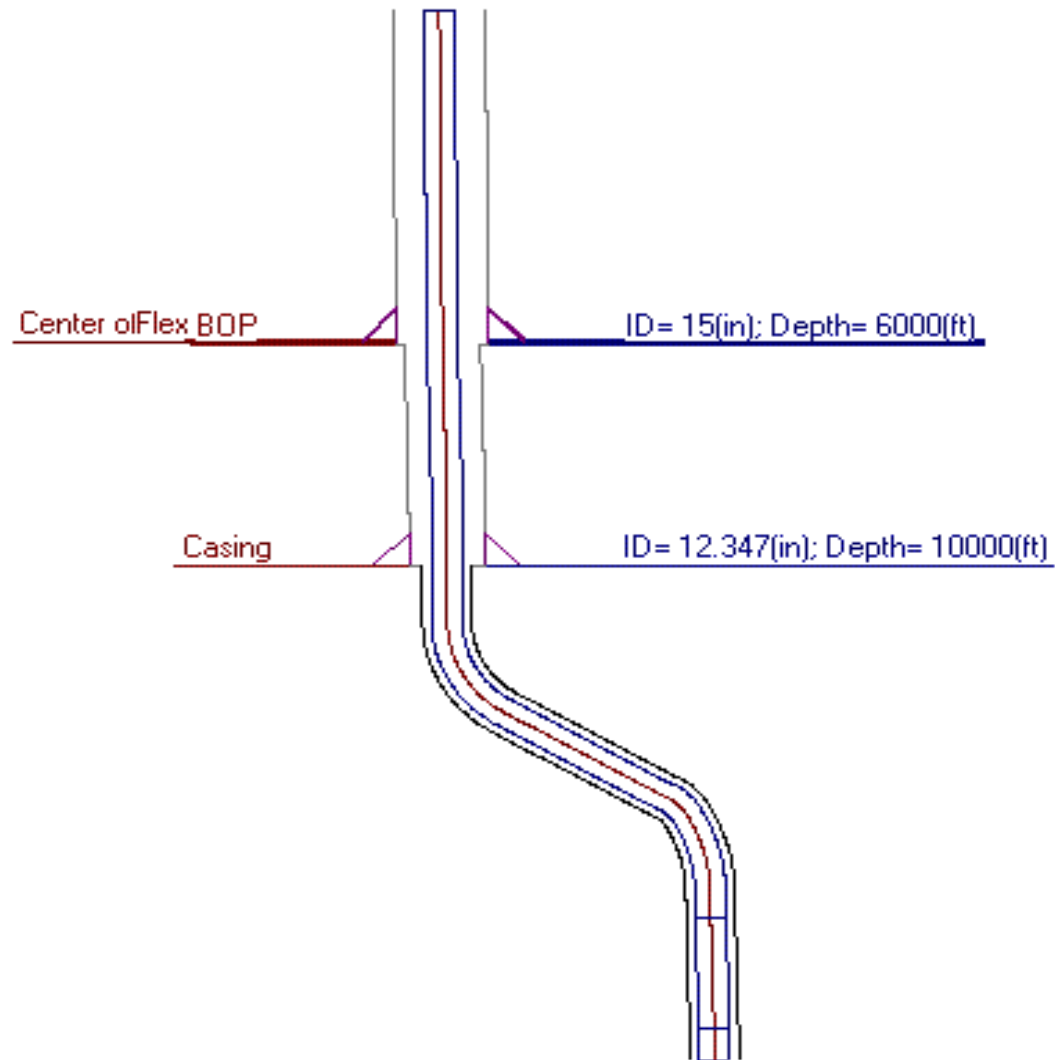
Well Schematic - [Extended Trajectory]

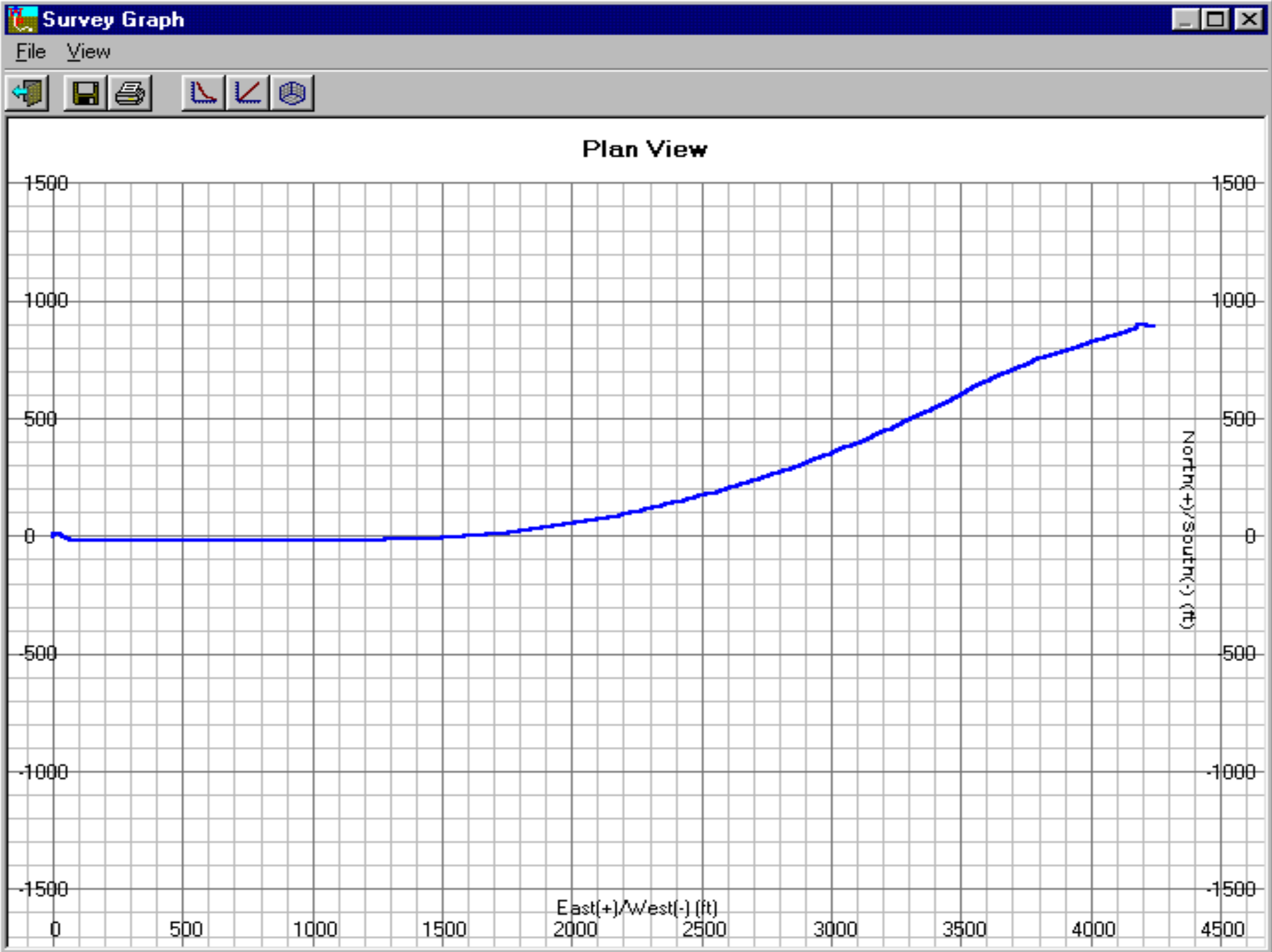
File View

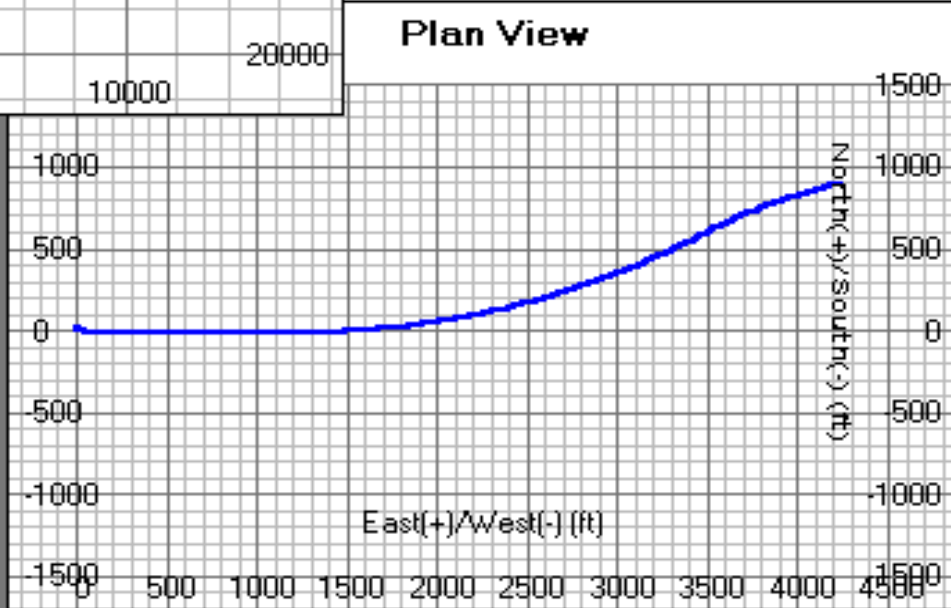
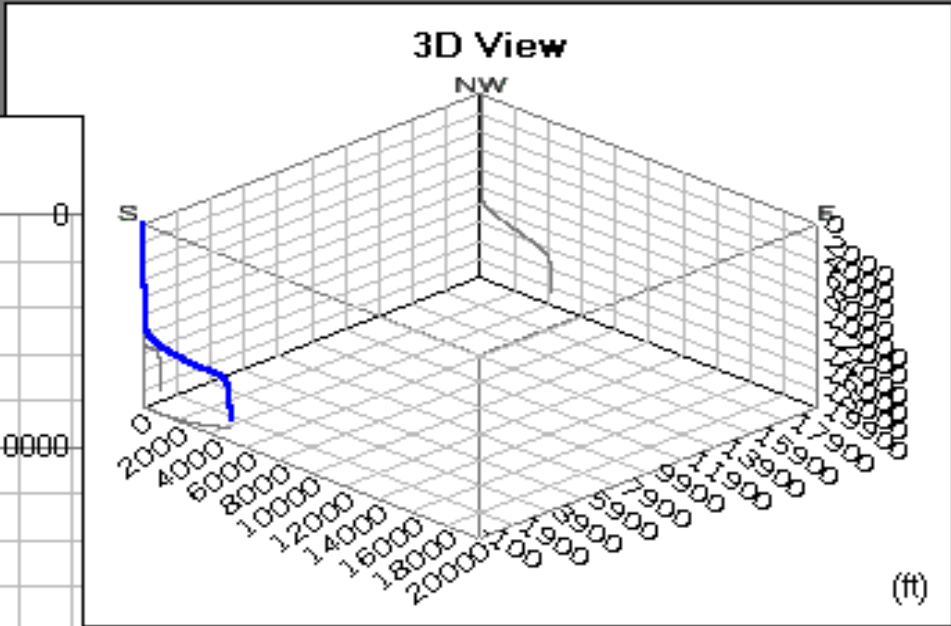
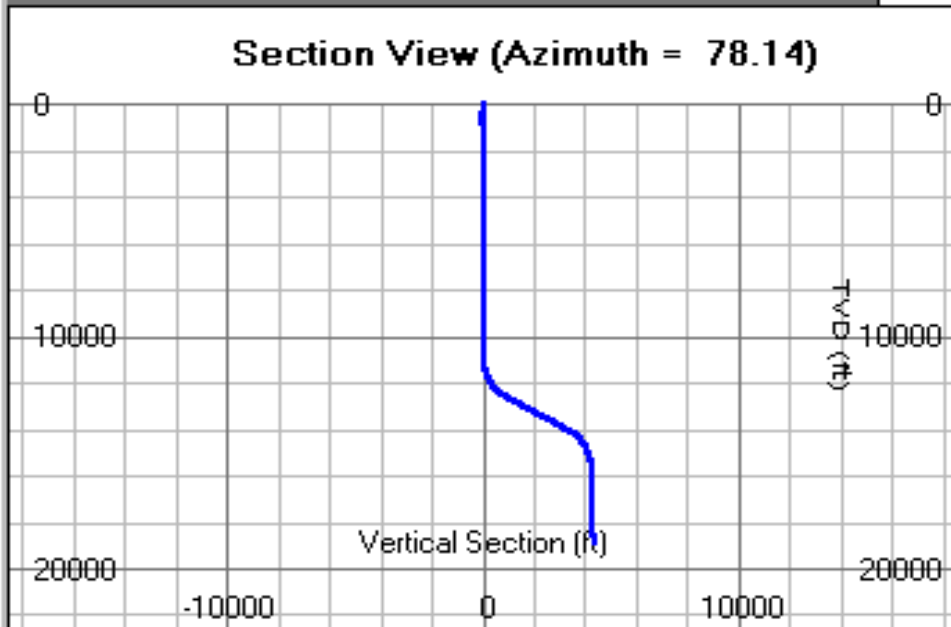


Well: Sample
Company: Maurer Technology

Field: Houston
Type: Schematic - Extended Trajectory







System of Units



Units: (Default English)

OK

Cancel

Undo All

	Group	Name	Selection	Format
1	Dimension	Length	(ft) ▼	0.0
2		Diameter/Thickness	(in) ▼	0.000
3		Nozzle Size	(1/32in) ▼	0
4		Choke Size	(1/64in) ▼	0
5		Transportation Distance	(mi) ▼	0.00
6		Area	(ft ²) ▼	0
7		Cross Section	(in ²) ▼	0.000
8		Fluid Volume	(bbl) ▼	0.00
9		Fuel Volume	(gal) ▼	0.0
10		Solid Volume	(ft ³) ▼	0.00
11		Cumulative Production	(MSTB) ▼	0.00
12		Stroke Displacement	(gal/stk) ▼	0.00
13		Gas Volume	(MMscf) ▼	0.00
14	Speed	Velocity	(ft/min) ▼	0.00
15		Trip Speed	(ft/min) ▼	0.00

Save

Save As...

Print

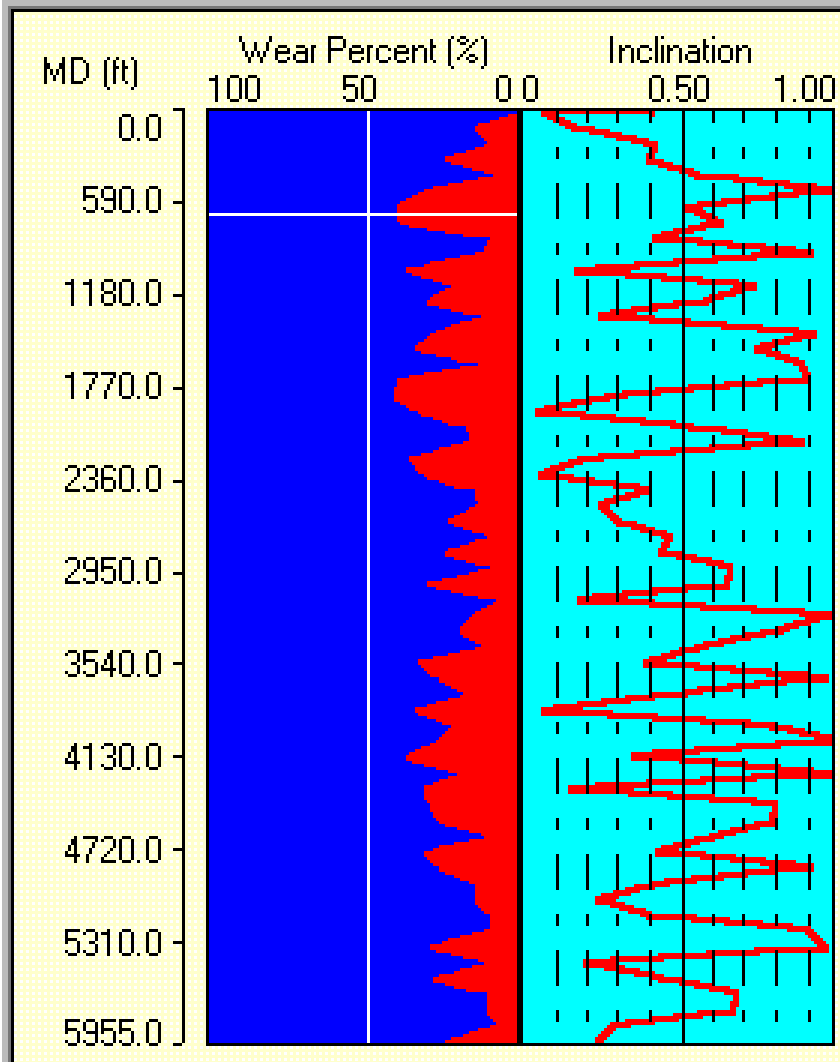
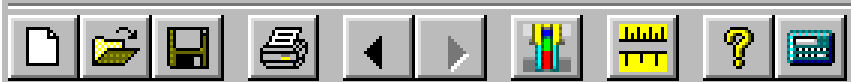
English

Metric

Other...

DRILLRISER - [Wear Schematic]

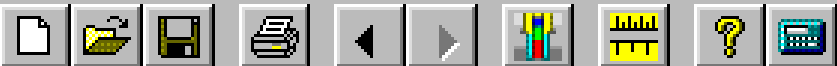
File Edit View Options Utilities Window Help



All		WF Base Case
Measured Depth (ft)	646.9	
Vertical Depth (ft)	646.9	
Inclination (deg)	0.76	
Azimuth (deg)	95.36	
Dogleg (deg/100ft)	2.48	
Incl. Dogleg (deg/100ft)	0.45	
Wear Factor (E-10/psi)	2.00	
Initial Wall Thickness (in)	0.500	
Remaining Wall Thick. (in)	0.302	
Wear Percent (%)	39.66	
Burst Strength (psi)	4898.0	
Collapse Strength (psi)	4810.0	

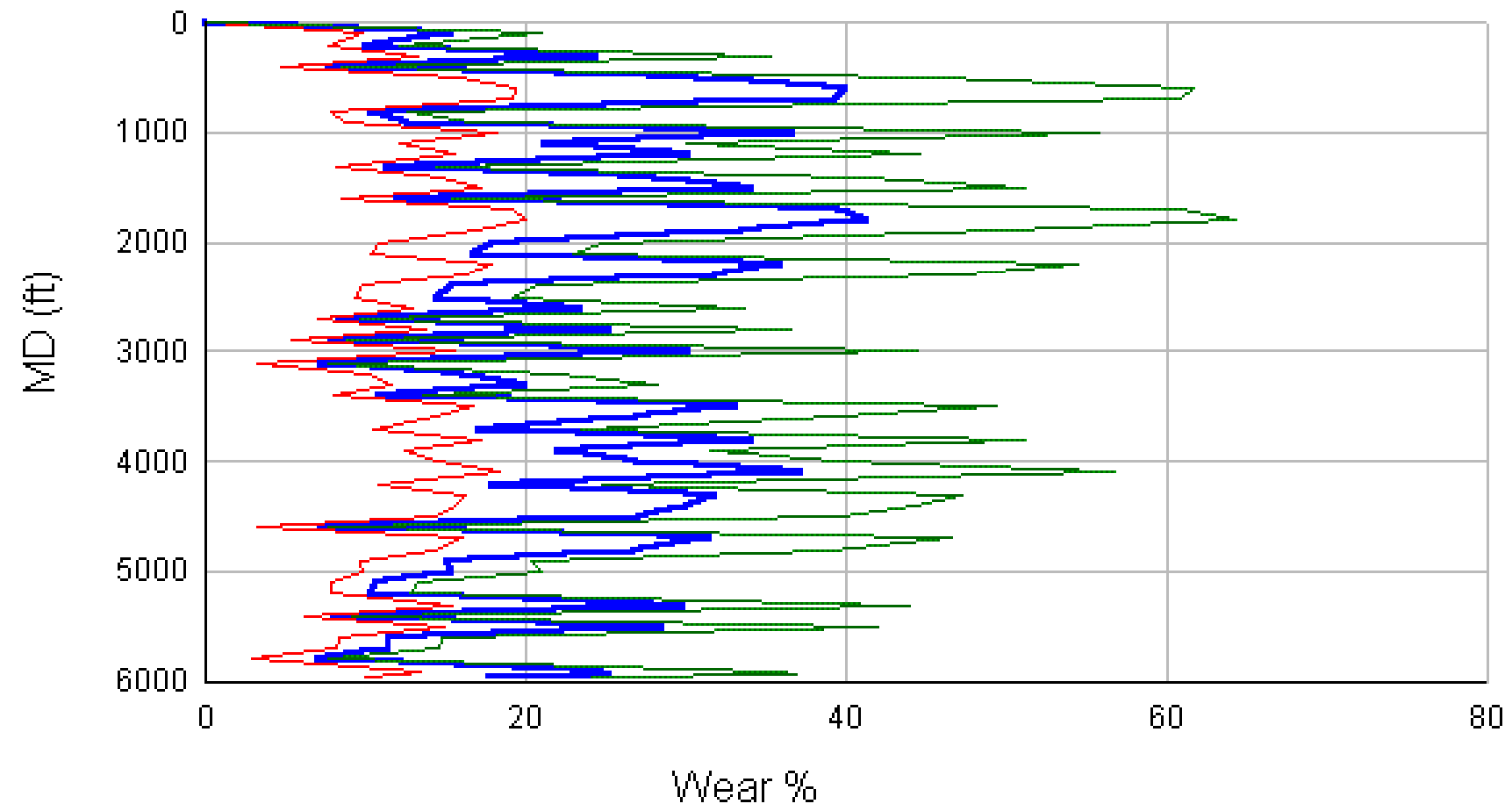
	MD (ft)	Dogleg (deg/100ft)	Wear Depth (in)	Wear %	Burst Strength (psi)	Collapse Strength (psi)
1	646.9	2.48	0.198	39.66	4898.0	4810.0
2	5945.0	0.77	0.126	25.25	6065.3	5931.8

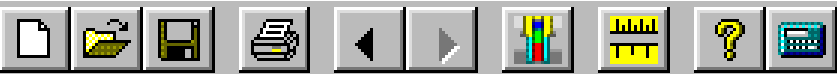
Worn
Remaining
Riser
Flex Jt.
Wear Log
MD (ft)
Apply
Clear
Print



Riser Wear %

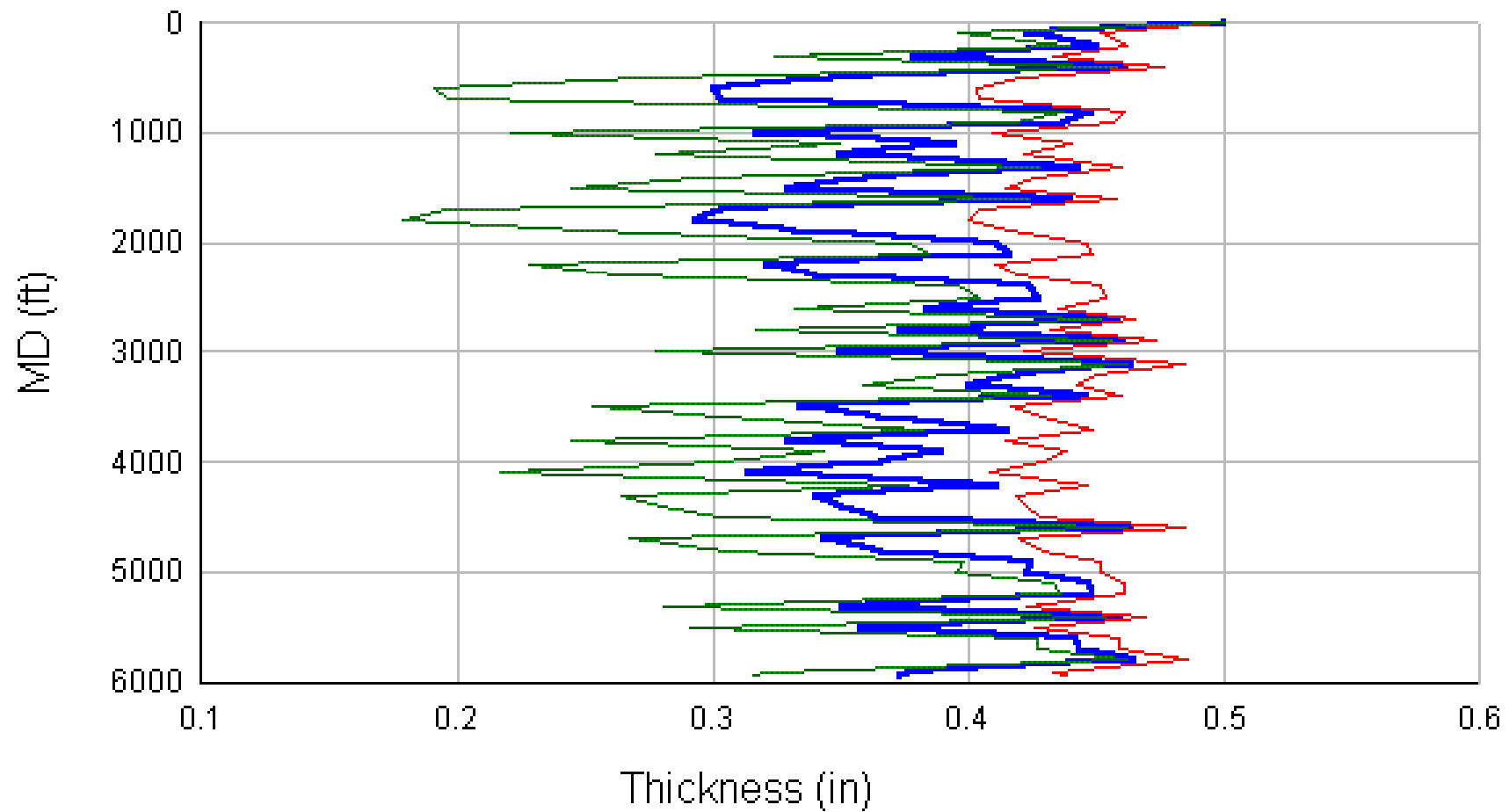
WF Base Case WF Low WF High

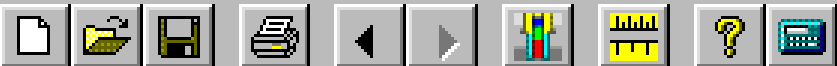




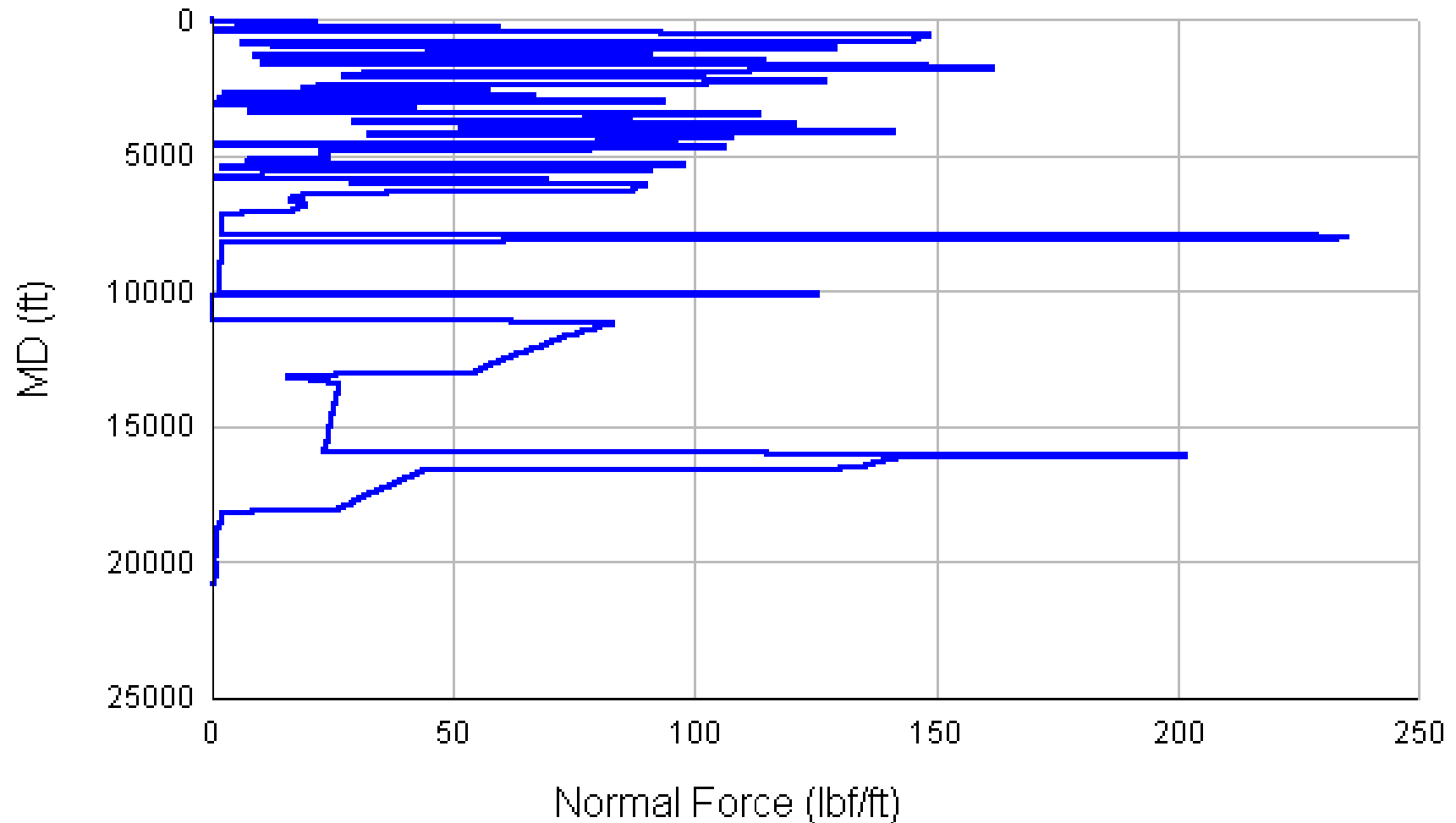
Riser Remaining Thickness

WF Base Case WF Low WF High





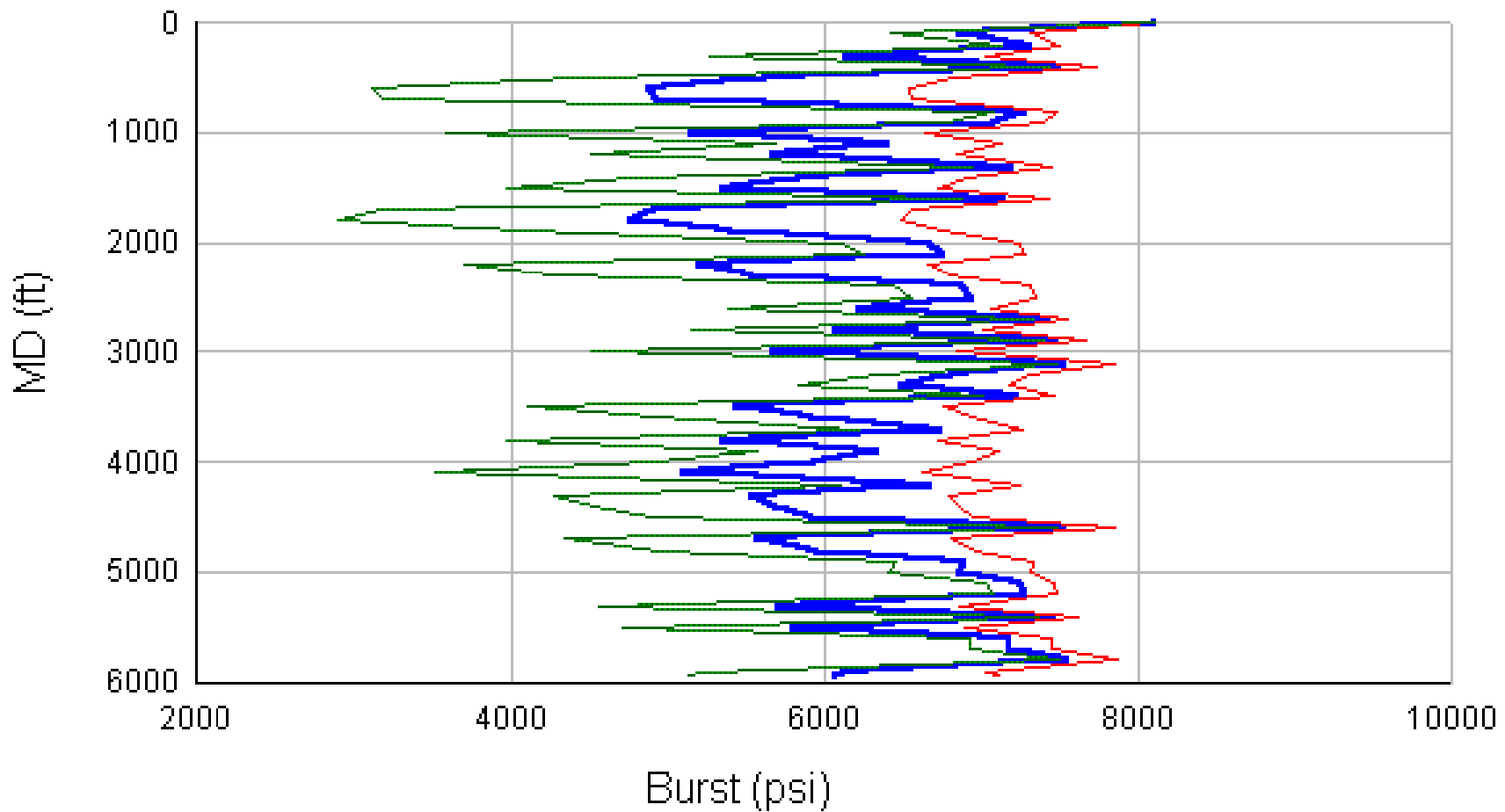
Normal Force

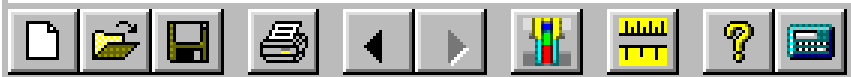




Riser Burst Pressure

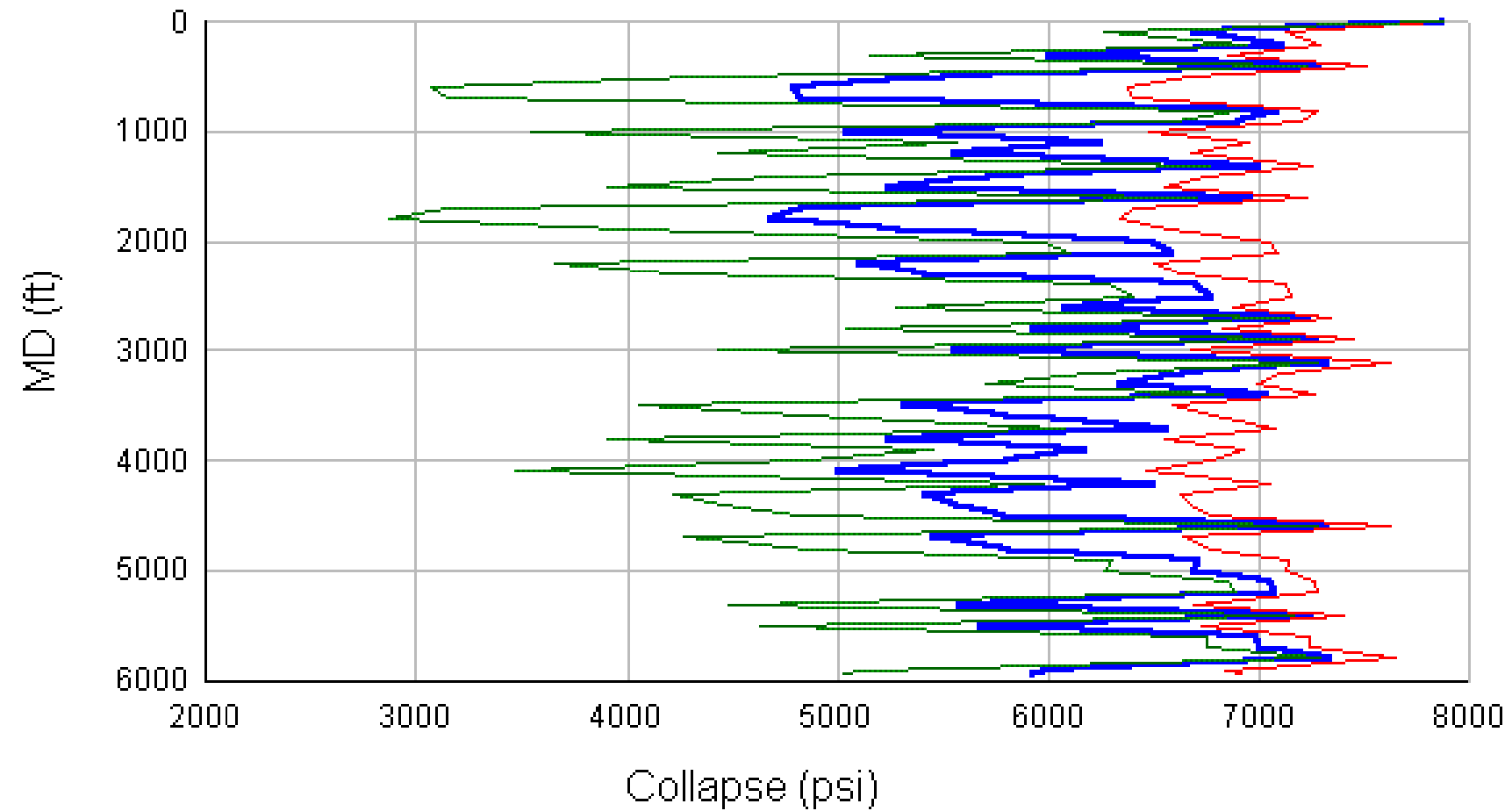
WF Base Case WF Low WF High





Riser Collapse Pressure

WF Base Case WF Low WF High



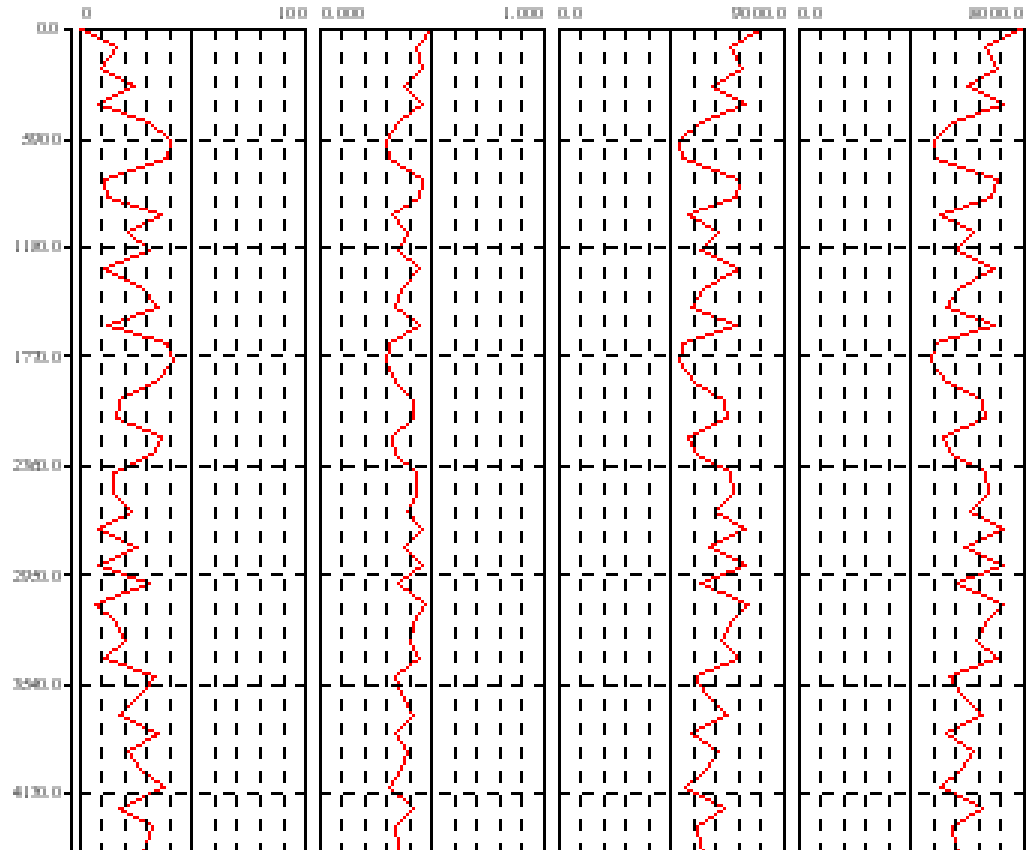


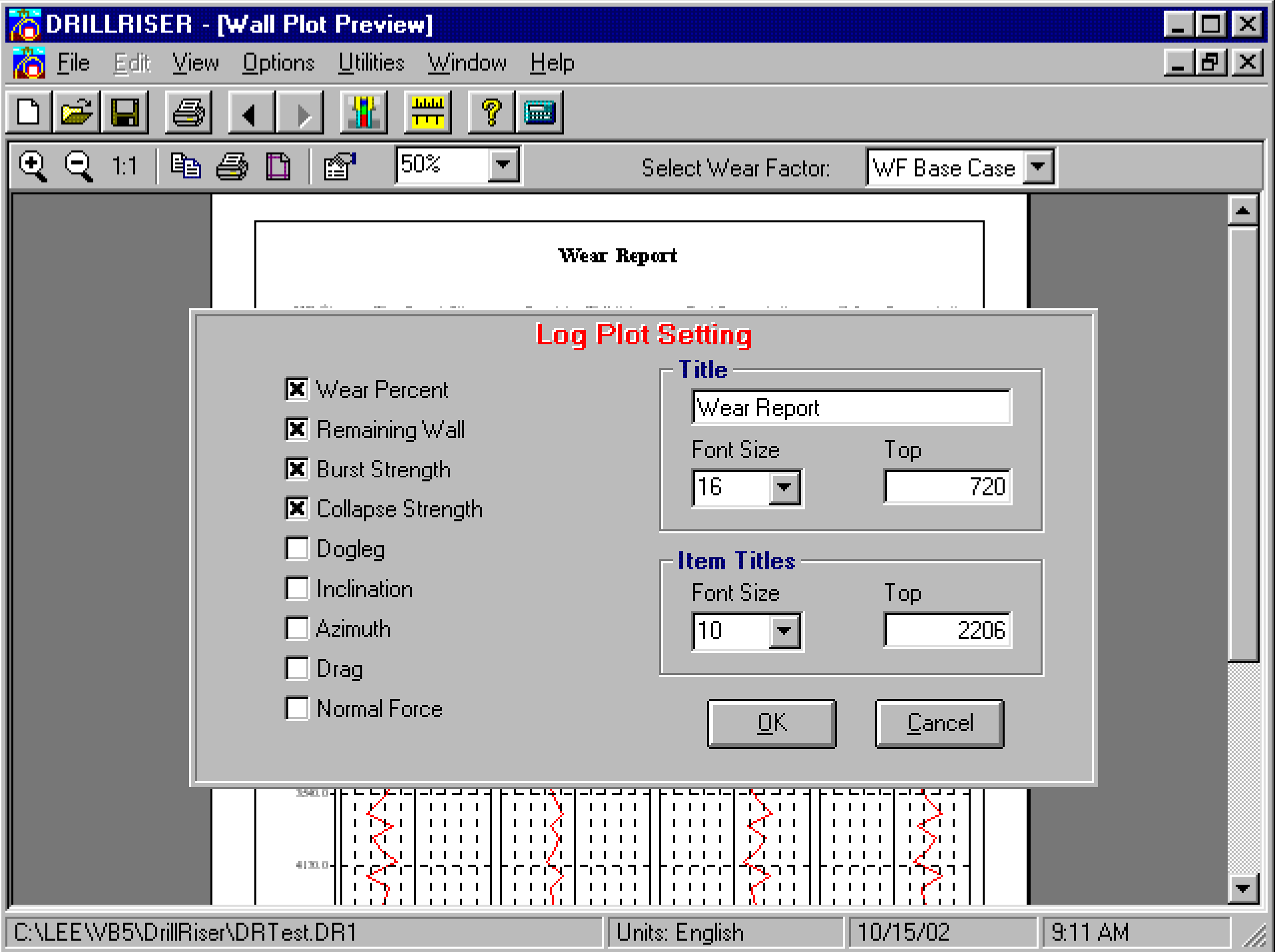
1:1 50%

Select Wear Factor: WF Base Case

Wear Report

MD (ft) Wear Percent (%) Normal og Wall (in) Burst Pressure (psi) Collapse Pressure (psi)





DRILLRISER - [Tabulated Results (Drill)]									
File Edit View Options Utilities Window Help									
Wear Results			Drag Force		Burst and Collapse		Summary		
Calc. Point	Measured Depth (ft)	Wall Thickness (in)	WF Base Rem. Wall (in)	WF Base Wear %	WF Low Rem. Wall (in)	WF Low Wear %	WF High Rem. Wall (in)	WF High Wear %	
1	0.0	0.500	0.500	0.00	0.500	0.00	0.500	0.00	
2	100.0	0.500	0.423	15.42	0.451	9.80	0.395	20.92	
3	200.0	0.500	0.451	9.89	0.462	7.62	0.439	12.12	
4	300.0	0.500	0.378	24.35	0.433	13.32	0.324	35.21	
5	400.0	0.500	0.462	7.62	0.476	4.75	0.457	8.51	
6	500.0	0.500	0.346	30.70	0.421	15.81	0.273	45.42	
7	600.0	0.500	0.300	39.91	0.403	19.39	0.192	61.69	
8	700.0	0.500	0.303	39.39	0.404	19.19	0.196	60.73	
9	800.0	0.500	0.449	10.24	0.461	7.75	0.437	12.67	
10	900.0	0.500	0.437	12.67	0.456	8.72	0.417	16.54	
11	1000.0	0.500	0.317	36.67	0.409	18.14	0.221	55.73	
12	1100.0	0.500	0.395	21.09	0.440	12.03	0.350	29.98	
13	1200.0	0.500	0.349	30.14	0.422	15.58	0.277	44.51	
14	1300.0	0.500	0.443	11.30	0.459	8.17	0.428	14.35	
15	1400.0	0.500	0.360	28.04	0.426	14.76	0.294	41.13	
16	1500.0	0.500	0.329	34.15	0.414	17.15	0.245	51.09	
17	1600.0	0.500	0.441	11.90	0.458	8.41	0.423	15.30	
18	1700.0	0.500	0.303	39.40	0.404	19.20	0.196	60.75	

C:\LEE\WB5\DrillRiser\DRTest.DR1

Units: English

10/15/02

9:11 AM

DRILLRISER - [Tabulated Results (Drill)]								
File Edit View Options Utilities Window Help								
Wear Results		Drag Force		Burst and Collapse			Summary	
Bit Located @20850.0	Measured Depth (ft)	Inclination Angle (deg)	Azimuth Angle (deg)	Vertical Depth (ft)	Dogleg Severity (deg/100ft)	Normal Force (lbf/ft)	Axial Drag (lbf)	
1	0.0	0.41	0.41	0.0	0.00	0.00	365404	
2	100.0	0.07	0.07	100.0	0.34	21.65	363575	
3	200.0	0.16	0.16	200.0	0.09	5.65	361745	
4	300.0	0.42	179.58	300.0	0.58	59.31	359915	
5	400.0	0.40	179.60	400.0	0.02	1.38	358086	
6	500.0	0.55	0.55	500.0	0.95	92.75	356256	
7	600.0	0.97	179.03	600.0	1.52	148.69	354427	
8	700.0	0.52	0.52	700.0	1.49	145.54	352597	
9	800.0	0.63	0.63	800.0	0.11	6.55	350768	
10	900.0	0.42	0.42	900.0	0.21	12.96	348938	
11	1000.0	0.91	179.09	1000.0	1.33	129.04	347108	
12	1100.0	0.17	179.83	1100.0	0.74	44.77	345279	
13	1200.0	0.73	0.73	1200.0	0.90	90.70	343449	
14	1300.0	0.58	0.58	1300.0	0.15	9.15	341620	
15	1400.0	0.25	179.75	1400.0	0.83	79.44	339790	
16	1500.0	0.92	0.92	1500.0	1.17	114.66	337961	
17	1600.0	0.74	0.74	1599.9	0.18	10.83	336131	
18	1700.0	0.89	179.11	1699.9	1.63	148.28	334302	

C:\LEE\WB5\DrillRiser\DRTest.DR1

Units: English

10/15/02

9:11 AM

DRILLRISER - [Tabulated Results (Drill)]									
File Edit View Options Utilities Window Help									
Wear Results		Drag Force			Burst and Collapse			Summary	
Calc. Point	Measured Depth (ft)	WF Base Rem. Wall (in)	WF Base Burst (psi)	WF Base Collapse (psi)	WF Low Rem. Wall (in)	WF Low Burst (psi)	WF Low Collapse (psi)	WF High Rem. Wall (in)	WF Bu
1	0.0	0.500	8105.0	7871.1	0.500	8105.0	7871.1	0.500	
2	100.0	0.423	6860.1	6690.6	0.451	7314.0	7122.1	0.395	
3	200.0	0.451	7306.5	7115.0	0.462	7490.3	7289.4	0.439	
4	300.0	0.378	6137.9	6001.3	0.433	7030.0	6852.3	0.324	
5	400.0	0.462	7489.8	7288.9	0.476	7722.0	7508.9	0.457	
6	500.0	0.346	5623.7	5508.4	0.421	6828.8	6660.8	0.273	
7	600.0	0.300	4878.3	4790.9	0.403	6538.7	6384.2	0.192	
8	700.0	0.303	4920.4	4831.6	0.404	6555.0	6399.8	0.196	
9	800.0	0.449	7278.5	7088.4	0.461	7479.3	7278.9	0.437	
10	900.0	0.437	7082.2	6901.8	0.456	7401.6	7205.3	0.417	
11	1000.0	0.317	5140.4	5043.7	0.409	6640.5	6481.3	0.221	
12	1100.0	0.395	6401.9	6253.6	0.440	7133.6	6950.7	0.350	
13	1200.0	0.349	5669.5	5552.4	0.422	6846.7	6677.8	0.277	
14	1300.0	0.443	7192.9	7007.1	0.459	7445.4	7246.8	0.428	
15	1400.0	0.360	5839.6	5715.6	0.426	6913.2	6741.1	0.294	
16	1500.0	0.329	5344.5	5240.1	0.414	6720.0	6557.1	0.245	
17	1600.0	0.441	7144.7	6961.3	0.458	7426.4	7228.7	0.423	
18	1700.0	0.388	6019.6	5899.7	0.434	6954.7	6789.5	0.386	

DRILLRISER - [Tabulated Results (Drill)]

File Edit View Options Utilities Window Help

Wear Results Drag Force Burst and Collapse **Summary**

Flex Joint

From (ft):	5945.0	To (ft):	5955.0
Center of Rotation MD (ft):	5950.0	Offset Angle (deg):	2.78

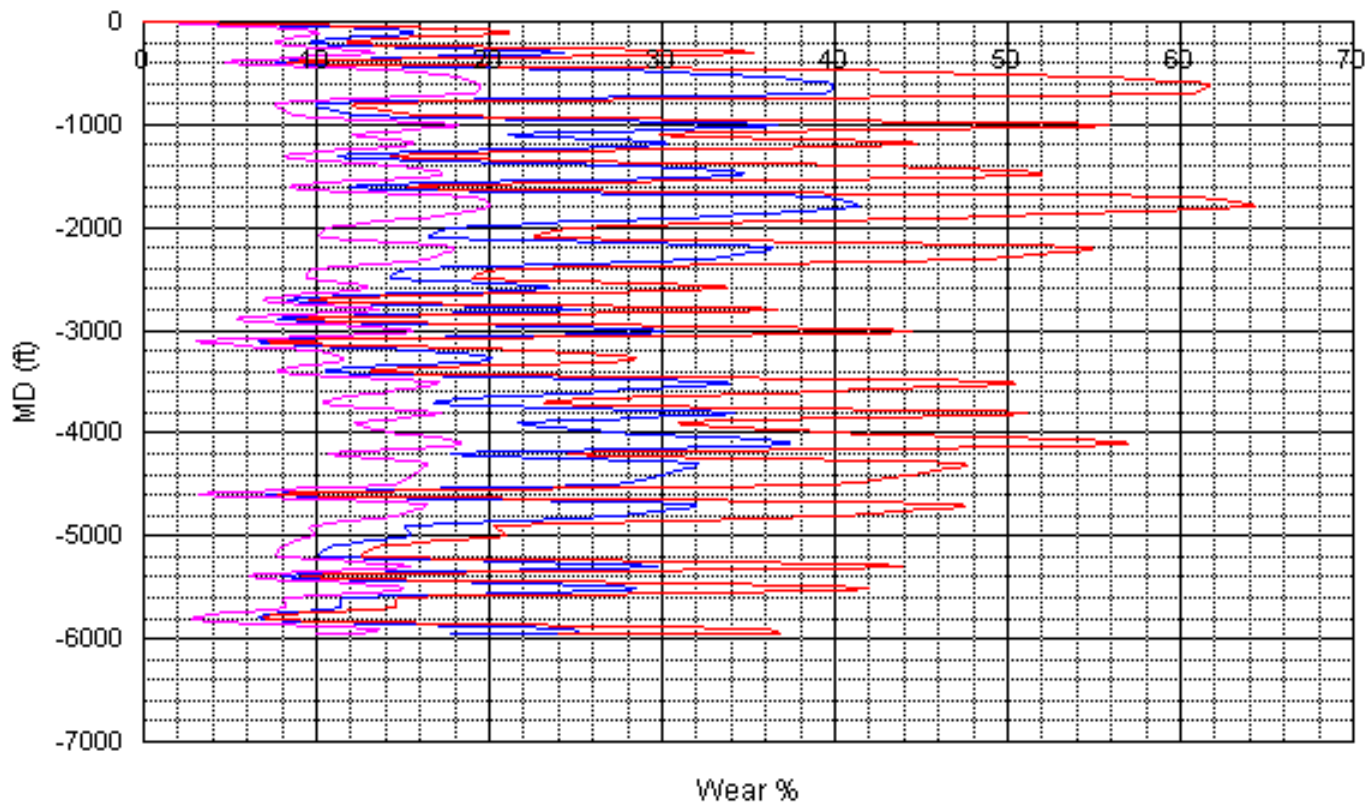
Wear Information	WF Base Case	WF Low	WF High
At Riser Bottom, MD= 5945.0			
Wear Percent (%)	25.25	12.42	36.83
Remaining Thickness (in)	0.374	0.438	0.316
Burst Limit (psi)	6065.3	7102.7	5127.6
Collapse Limit (psi)	5931.8	6921.3	5031.3
At Flex Joint Apex, MD= 5950.0			
Wear Percent (%)	17.64	9.81	23.91
Remaining Thickness (in)	6.177	6.765	5.707
Burst Limit (psi)	74059.2	79469.1	69464.6
Collapse Limit (psi)	65404.1	69856.7	61617.5
Maximum Wear %, MD= 1800.0			
Wear Percent (%)	41.34	19.95	64.33
Remaining Thickness (in)	0.293	0.400	0.178
Burst Limit (psi)	4762.1	6493.6	2897.2
Collapse Limit (psi)	4678.8	6341.2	2865.8

C:\LEE\WB5\DrillRiser\DRTest.DR1 Units: English 10/15/02 9:12 AM

Chart Area =

Riser Wear %

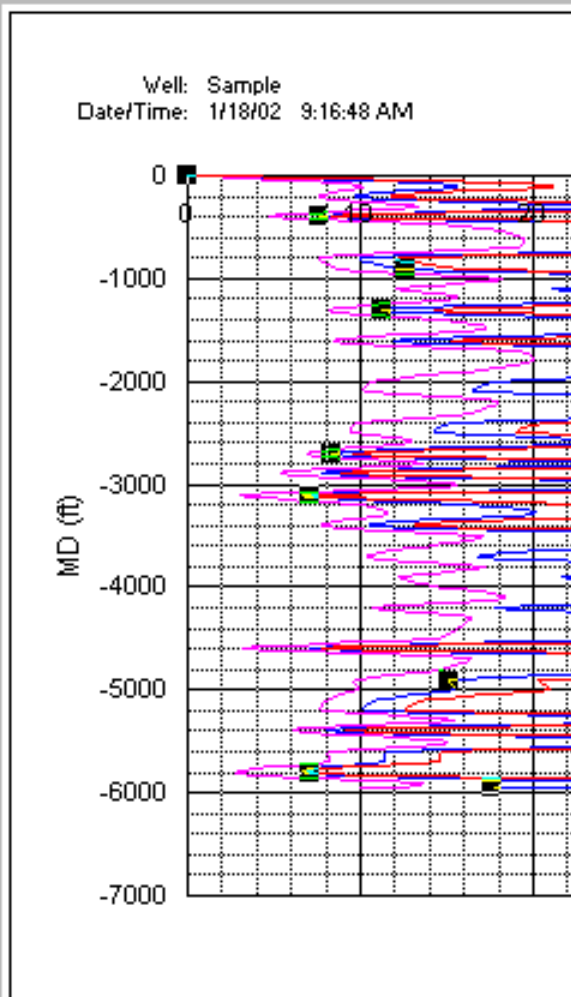
Well: Sample
Date/Time: 1/18/02 9:16:48 AM



Microsoft Excel - Book1

File Edit View Insert Format Tools Chart Window Help

Series "WF B..." = =SERIES("WF Base Case",Data!\$A\$2:\$A\$64,Data!\$B\$2:\$B\$64,1)



Riser Wear %

Format Data Series

Line

Automatic
 None
 Custom

Style: [Blue Line] [v]
Color: [Blue] [v]
Weight: [Medium] [v]

Smoothed line

Sample

Marker

Automatic
 None
 Custom

Style: [Square] [v]
Foreground: [No Color] [v]
Background: [No Color] [v]

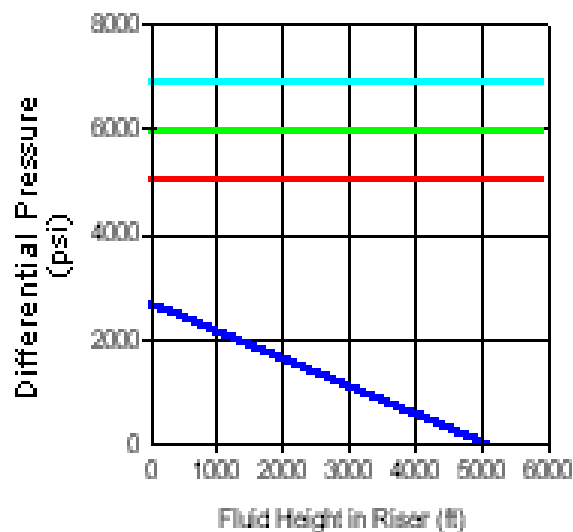
Size: [3] [v] pts

Shadow

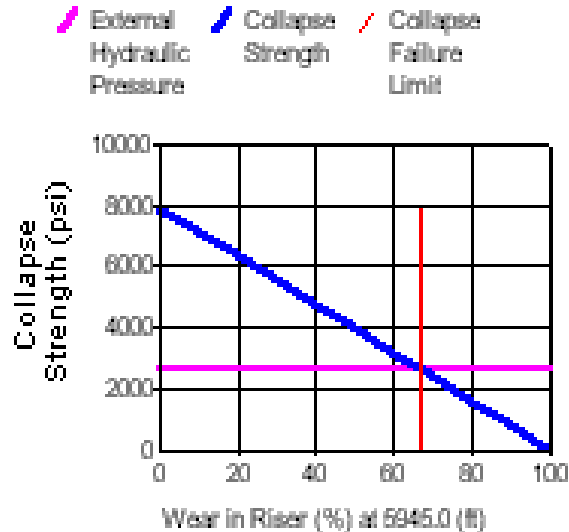
OK Cancel

Riser Strength Analysis

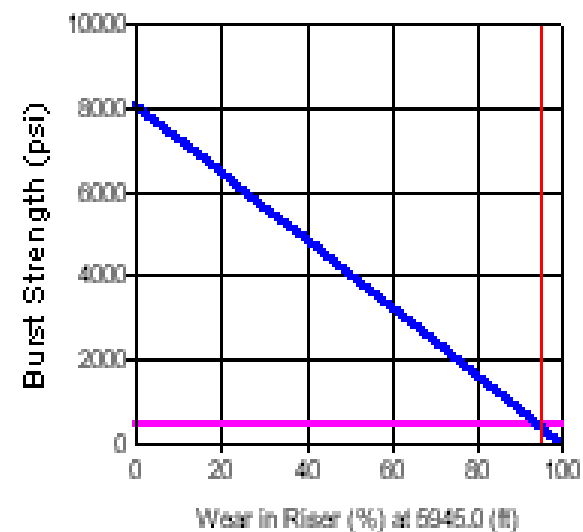
Collapse Failure at Bottom of Riser
(mud weight 10.00 (ppg))



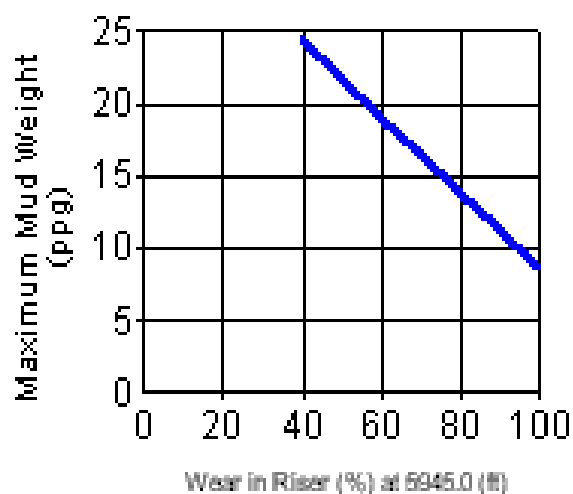
Collapse Failure in Riser
(worst case: evacuated riser)



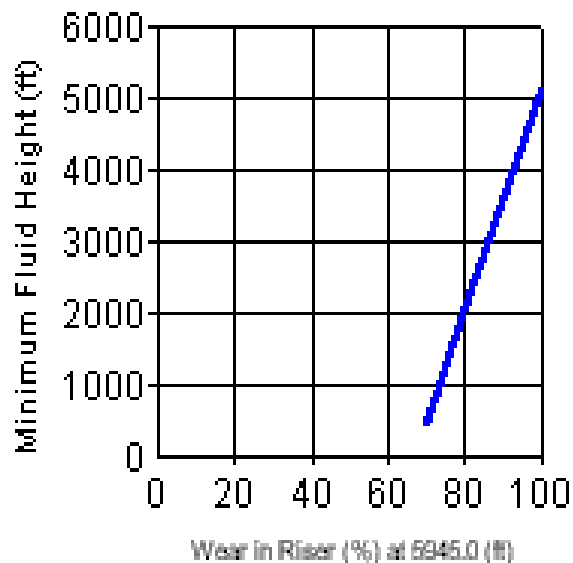
Burst Failure in Riser
(mud weight 10.00 (ppg))



Maximum Mud Weight in Riser (burst failure)



Minimum Fluid Height in Riser (collapse failure)
(mud weight 10.00 (ppg))



Input

Sea Water Weight (ppg)

Riser Mud Weight (ppg)

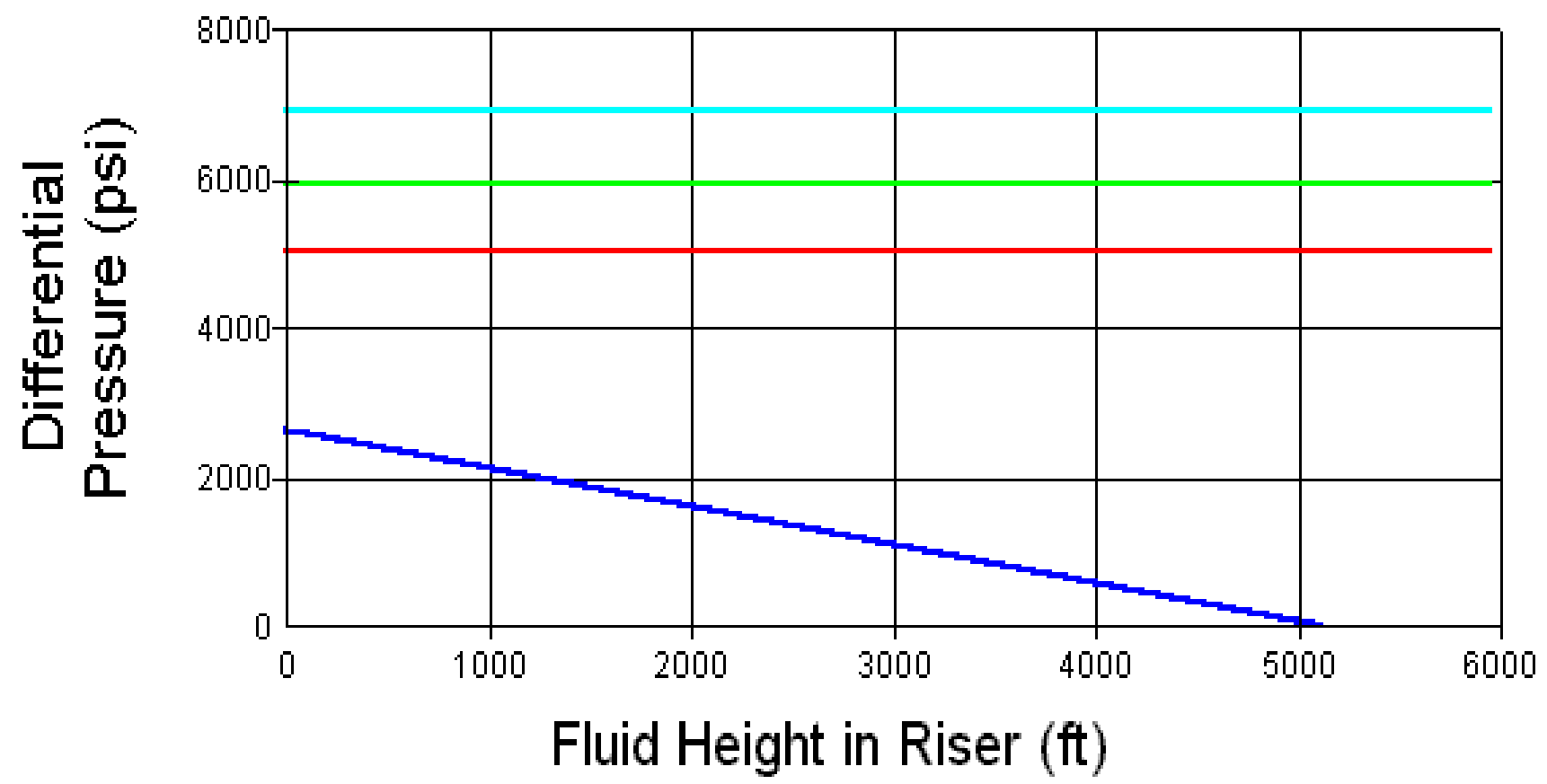
Depth of Interest MD (ft)

Depth of Interest MD should be \leq Riser Bottom MD [= 5945.0 (ft)]

Double-click on any graph to maximize it.

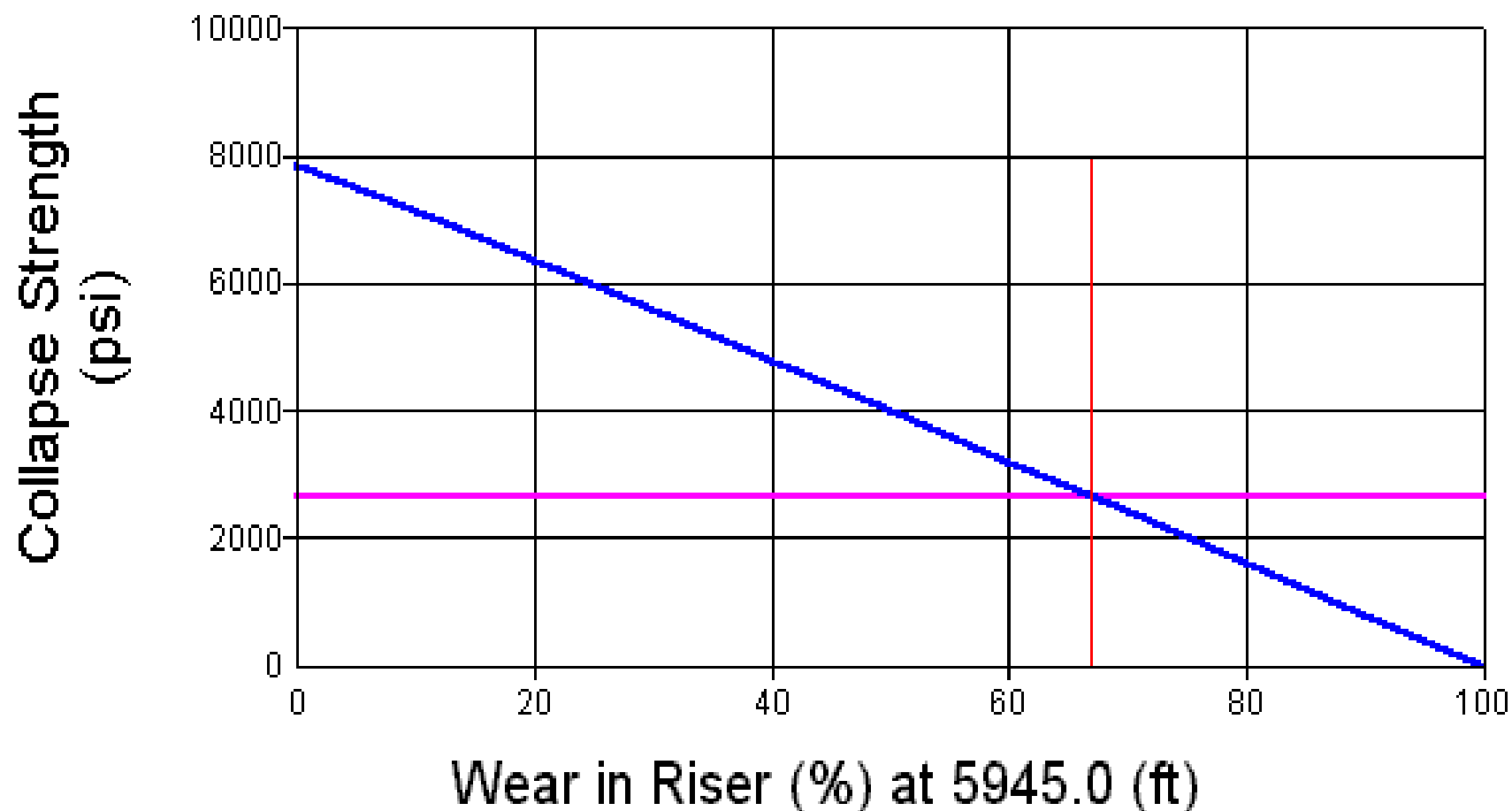
Collapse Failure at Bottom of Riser (mud weight 10.00 (ppg))

- / Differential Pressure
- / Collapse Strength from WF Base
- / Collapse Strength from WF Low
- / Collapse Strength from WF High



Collapse Failure in Riser (worst case: evacuated riser)

External Hydraulic Pressure Collapse Strength Collapse Failure Limit



Wear Factor Field Match



Calculated Wear at Depth of Interest

MD (ft) < 5955.0	Wear Factor	Current Wear %	Riser/Casing Thick. (in)	Wear Depth (in)	Inclination Dogleg (deg/100ft)	Inclination (deg)	Total Dogleg (deg/100ft)
3000	2.00 ▼	30.09	0.500	0.150	0.22	0.66	1.10

Find Effective Wear Factor from Field Data

Measured Wear Depth (in)

Effective Wear Factor (E-10/psi)

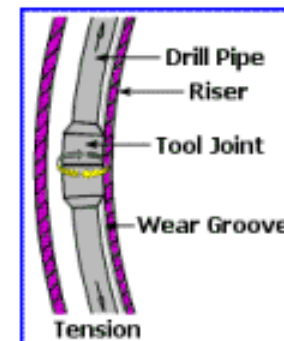
Note: If the measured wear depth = riser/casing wall thickness, the effective wear factor is the minimum wear factor which will wear through riser/casing wall.

Close

- [-] Introduction
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 - [-] Wear Factor Field Match Window
- [-] MTI Software
 - [-] MTI Software
 - [-] Who is MTI?

Background

DRILLRISER was developed by Maurer Technology Inc. as part of the DEA-137 project on Minimizing Wear in Deepwater Risers, Flex Joints and BOPs. This powerful program combines laboratory results and theoretical modeling developments from the previous DEA-42 Casing Wear Technology Project with new concepts and algorithms developed under the DEA-137 project. DRILLRISER accurately predicts the location and magnitude of wear in the riser/casing string for offshore geometries. It predicts volumetric riser wear by 1) calculating the energy imparted by the rotating tool joint to the riser at multiple positions along the riser and 2) dividing this by the amount of energy required to wear away a unit volume of the riser. Lateral force, which presses the tool joint against the riser and casing, is a combination of gravity, buoyancy, tension in the drill string, and hole trajectory geometry. Wear depth at each point along the riser is calculated from the volumetric wear. Dynamic effects, such as resonant vibration of the drill string, are not considered in this model.



A critical element in the model that evolved from theoretical development of casing-wear analysis is an empirical “[wear factor](#).” This material-dependent parameter quantifies the energy required to remove a unit volume of riser material for a given set of conditions (riser/tool-joint geometry, drilling fluid, solids content, etc.). Wear-factor data are incorporated into the program from an extensive range of laboratory tests conducted as part of the DEA-42 project. Evaluation and application of the wear factor is the crucial element in the transition of the model from a theoretical exercise to a practical engineering tool.

For offshore drilling, riser wear can be an expensive problem. If the wear causes loss of riser integrity, the risk to personnel and equipment is significant due to well-control situations that can result. The development of a special tubular wear model to predict riser wear evolved out of an investigation of a riser failure experienced by Phillips Petroleum Company in the Gulf of Mexico. The investigation (conducted by Gordon Poss of Phillips and Russell Hall of MTI) resulted in the development of a computer model that accurately predicted riser wear at the bottom of the riser in the Phillips well. The original algorithm has since been extended by Russell Hall to model [wear in seafloor components](#).

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Operation Page

[Click on the screen for context-sensitive help]

DRILLRISER
File Edit View Options Utilities Window Help

Data File - C:\ME\DRILLRISER1\WorthaErvine.DR1

Project Survey Tubulars Wellbore **Operation** W. Factor W. History

Reference Depth

Last Survey MD: 21000 (ft)

Operation Start and End Depth

Operation Start MD: 10200 (ft)
Operation End MD: 21000 (ft)

Drilling Mud

	Bottom of Interval (ft)	Mud Weight (ppg)	
1	11000	10	Insert
2	21000	12	
3			Delete
4			
5			

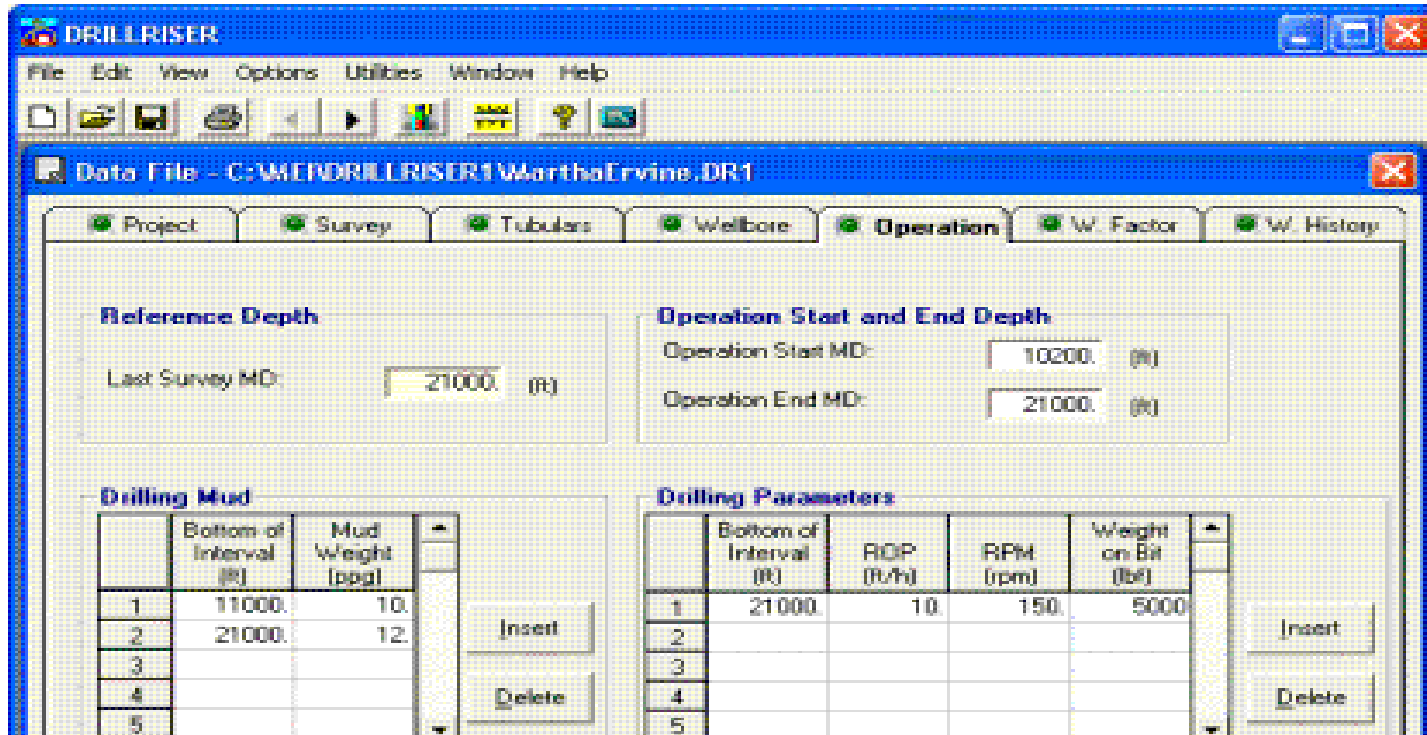
Drilling Parameters

	Bottom of Interval (ft)	ROP (ft/h)	RPM (rpm)	Weight on Bit (lbf)	
1	21000	10	150	5000	Insert
2					
3					Delete
4					
5					

C:\ME\DRILLRISER1\WorthaErvine.DR1 Units: Custom 10/1/2002 1:42 PM

Operation Page

[Click on the screen for context-sensitive help]



ling bit depths. The Bottom of Interval depth specifies the bottom of the interval containing the mud weight

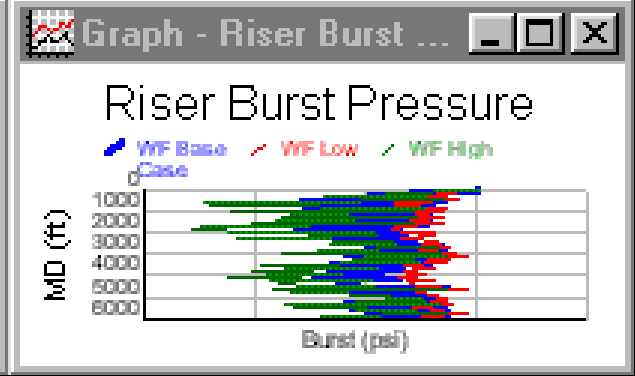
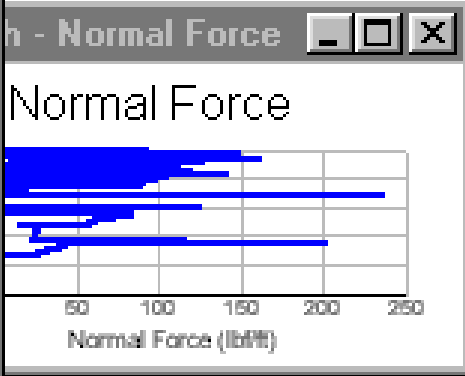
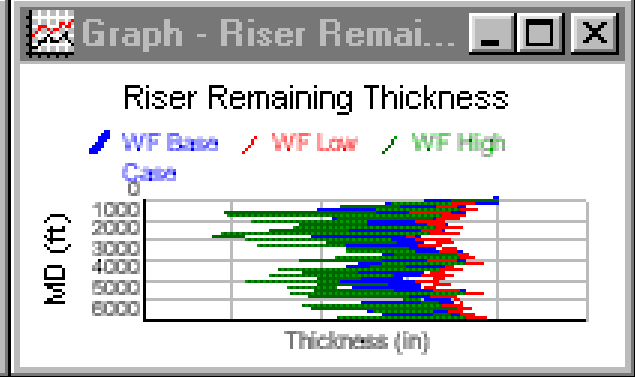
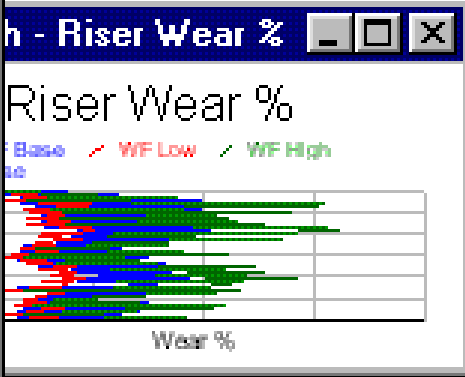
New Ctrl+N
 Open... Ctrl+O
 Save Ctrl+S
 Save As...
 Save Wear Data...

Page Setup...
 Print Ctrl+P
 Print All
 Print Current Window

Export...
 Copy
 Export MS Office Report...

1 C:\LEE\WB5\DrillRiser\DRTest.DR1
 2 C:\LEE\WB5\DrillRiser\q4.DR1
 3 C:\LEE\WB5\DrillRiser\test.DR1
 4 C:\LEE\WB5\DrillRiser\test3.DR1

Exit



Plot Preview

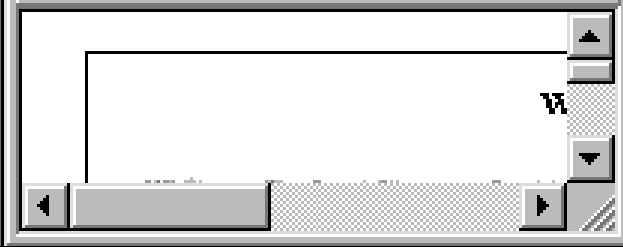
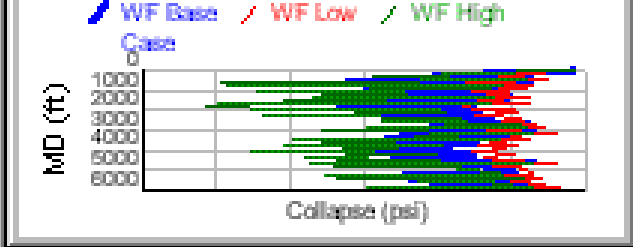
1:1

This panel contains a 'Plot Preview' section with a 1:1 scale and several icons for file operations: a document icon, a printer icon, a folder icon, and a document with a magnifying glass icon.

Tabulated Results (...)

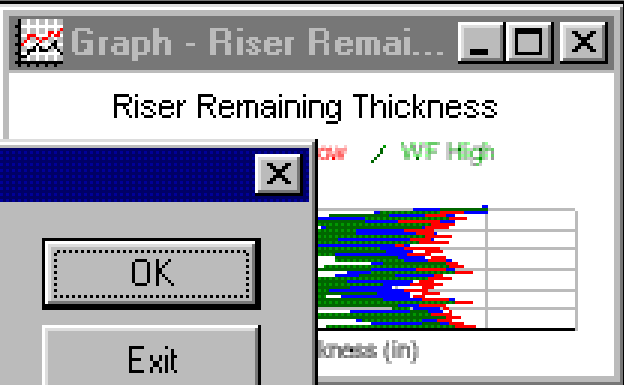
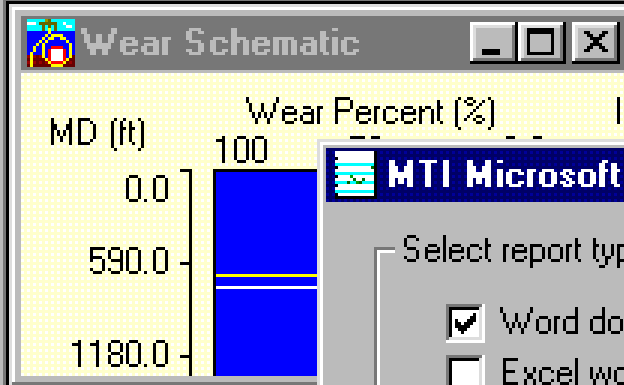
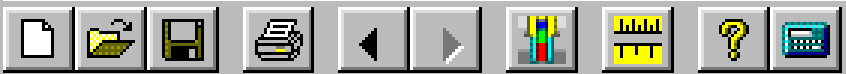
wear Results Drag Force burst and Collapse Summar

This panel is titled 'Tabulated Results (...)' and contains several buttons: 'wear Results', 'Drag Force', 'burst and Collapse', and 'Summar'. The 'Summar' button is highlighted.



Flex Joint
 From (ft):
 Center of Rotation MD (ft):

This panel displays a yellow background with the following text: 'Flex Joint', 'From (ft):', and 'Center of Rotation MD (ft):'. The text is currently blank.



MTI Microsoft Office Report Maker

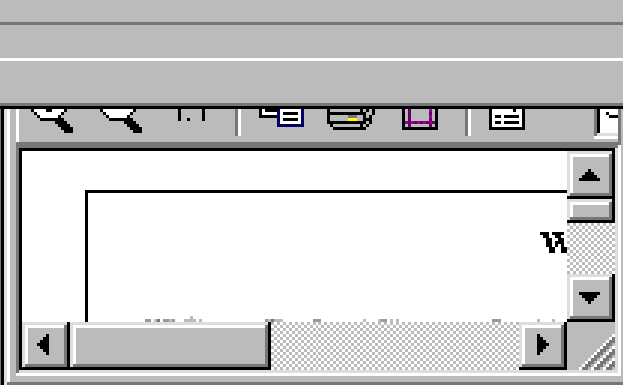
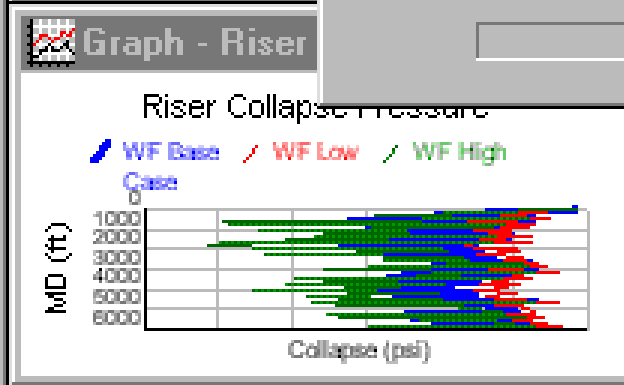
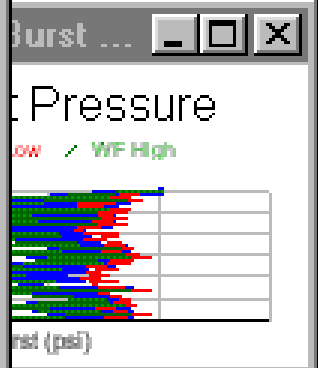
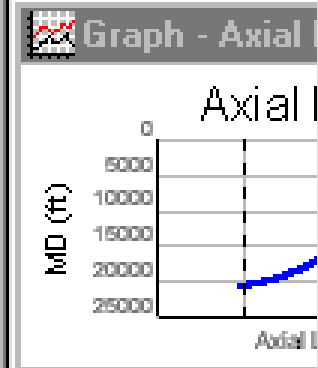
Select report type(s):

- Word document (tables and graphs)
- Excel workbook (tables only)
- PowerPoint presentation (graphs only)

OK

Exit

Stop



Results | Force | Collapse | **Summar**

Burst and

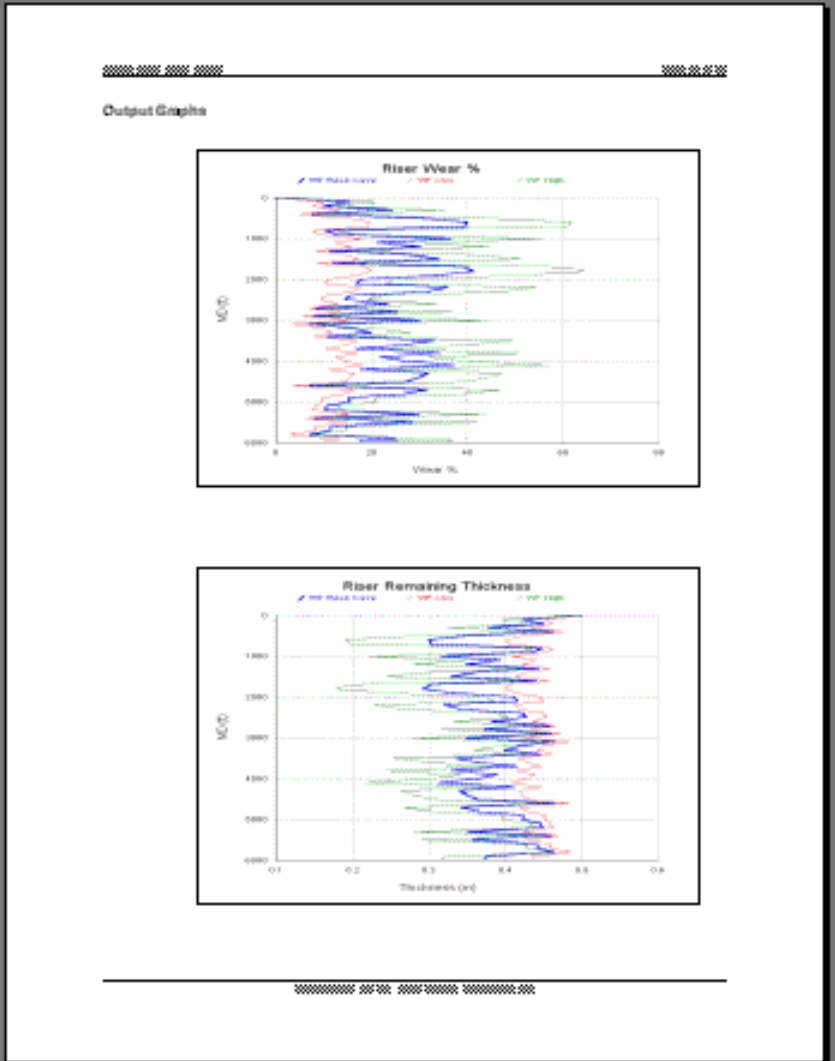
Flex Joint

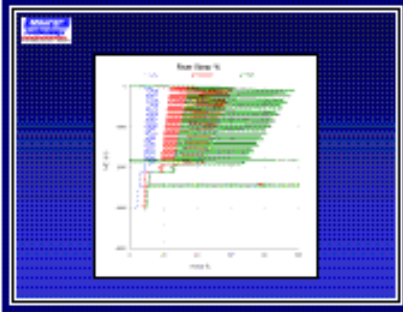
From (ft):

Center of Rotation MD (ft):

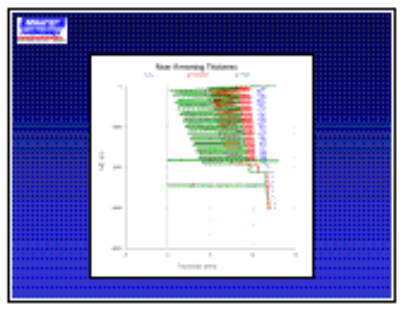


1	2	3	4
5	6	7	8
9	10	11	12
13	14	15	16
17	18	19	20
21	22	23	24
25	26	27	28
29	30	31	32
33	34	35	36
37	38	39	40
41	42	43	44
45	46	47	48
49	50	51	52
53	54	55	56
57	58	59	60
61	62	63	64
65	66	67	68
69	70	71	72
73	74	75	76
77	78	79	80
81	82	83	84
85	86	87	88
89	90	91	92
93	94	95	96
97	98	99	100

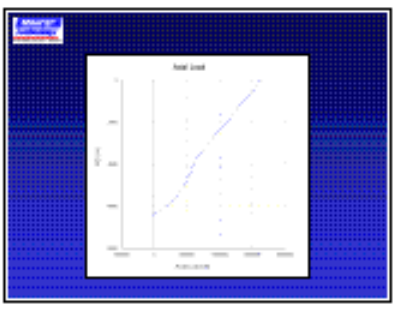




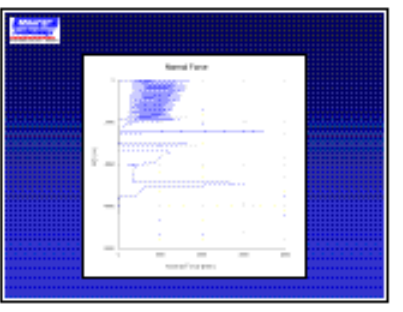
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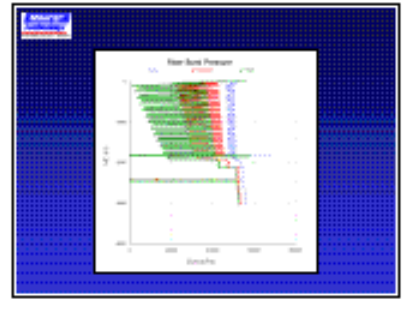
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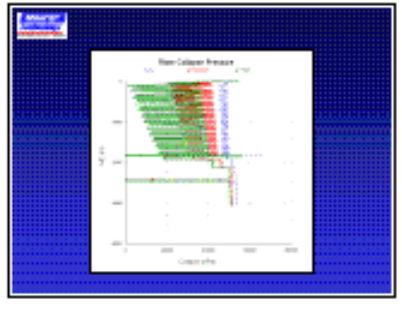
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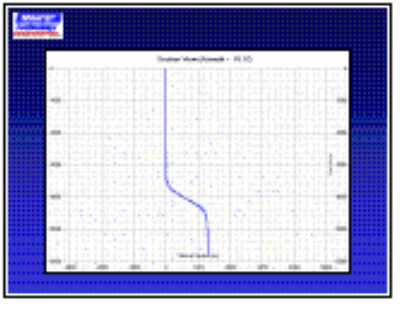
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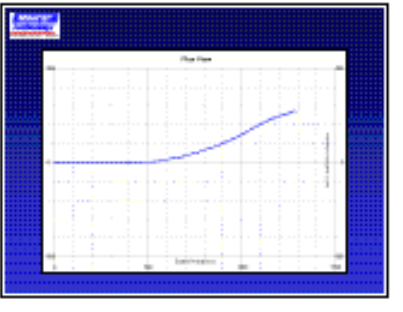
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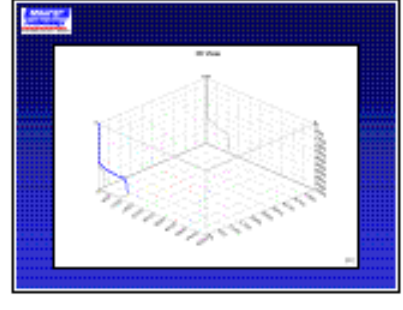
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7



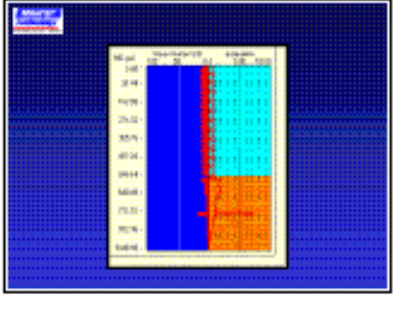
8



9



10



11

DEA-137 Final CD Contains:

- * DrillRiser Program**
- * DrillRiser User's Manual**
- * Report: "Derivation of Offshore Wear Model"**

The End