



# User Guide for iPhone & iPod Touch

- Introduction
- iPhone 4 x iPhone 5
- Main Menu
- Data Files
- Importing from Other Apps
- Unit Systems
- Well Configuration
- Main View
- Circulation Options
- Timer / Pause
- Set/Reset Alarms
- Graph Options
- Drilling Simulation
- Restart
- Send Screenshot by Email
- About

Revision using version: 1.5 with iOS 6.1



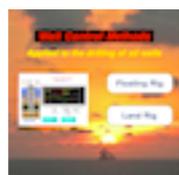
- 1) Panel with the following parameters: pump pressure, mud pump speed, strokes totalizer, flow rate, mud weight, bit depth, rotary speed, hookload and weight on the bit;
- 2) Instruments with pointers to the parameters: pump pressure, hookload, weight on the bit and rotary torque;
- 3) Geograph with parameters: drillpipe pressure, choke pressure, active volume, hookload, weight on the bit, length drilled, flow in, flow out, percent of flow, rotary torque, rotary speed and drilling rate.
- 4) Panel with alarms: pump failure, vol high, flow high, bop failure, bop status and choke status;
- 5) Toolbar with buttons: Well Config, Circulation Options, Set Alarms, Graph Limits, X-times faster, Pause/Continue, Restart, Send by email, about;
- 6) set drillstring with drillpipe1, drillpipe2, heavy-weight, drillcollar1 and drillcollar2;
- 7) Select floating rig or land rig;
- 8) Select unit systems: International, field1 (imperial) and field2 (mix);
- 9) set fluid parameters: mud weight, plastic viscosity, yield point and initial gel;
- 10) Select rheological models: Power or Bingham;
- 11) Set gradients: absorption, fracture and temperature;
- 12) Set jet nozzles or fixed TFA;
- 13) Set choke parameters and BOP test pressure;
- 14) Set Surface circulation volume;
- 15) Set surface circulation equipments (mud pump and lines);
- 16) Set four formations to drilling (height, pore gradient, fluid density and sof/hard);
- 17) Save configuration to data files and share by iCloud;
- 18) Select circulation options: drillpipe -> Riser, Kill -> Riser, and Close BOP;
- 19) Set alarms: pit gain, flow rate out, max pump pressure and max pump power;
- 20) Register the kill line losses and pump pressure at the kill speed;
- 21) show the well with drillstring and the drillbit on rotating;
- 22) Show schematic of well with drillstring, kick and neutral point (%);
- 23) Adjust pump speed, weight on the bit and rotary speed to drilling until kick detection;
- 24) Shut-in the well using hard method;
- 25) Register shut-in drillpipe pressure (SIDPP) and choke pressure (SICP) and gain volume;
- 26) behavior of the kick: keeping the well closed and keeping the well opened;
- 27) Simulations: Drilling, Kick detection, Shut-In, Underground Blowout at shoe and blowout with failure of bop;
- 28) Capacities and Volumes calculations;
- 29) Hydrostatic and critical pressures calculations;
- 30) Hydraulics calculations;

Note: This Drilling Simulator NOT allows to control the well after the kick detection and shut-in. The simulation ends after the simulations of underground blowout and blowout to surface. **Use other apps for:**

Well Control Simulator



Well Control Methods



Leak-Off Test Simulator



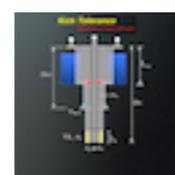
Leak-Off Test Analyzer



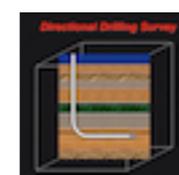
Drilling Hydraulics



Kick Tolerance



Directional Survey



Drilling Cost



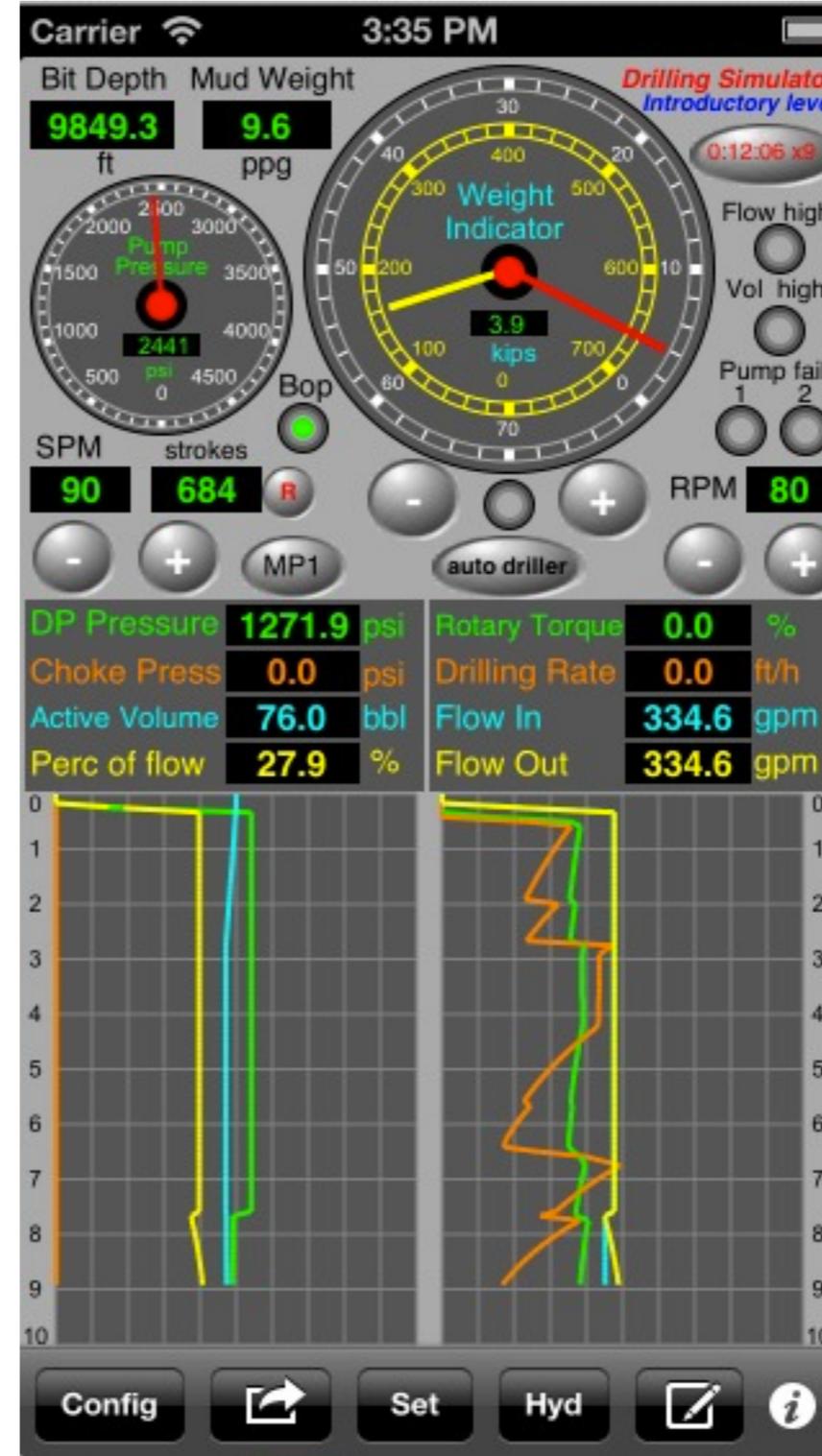
Website



iPhone 4



iPhone 5



iPhone 4



iPhone 5



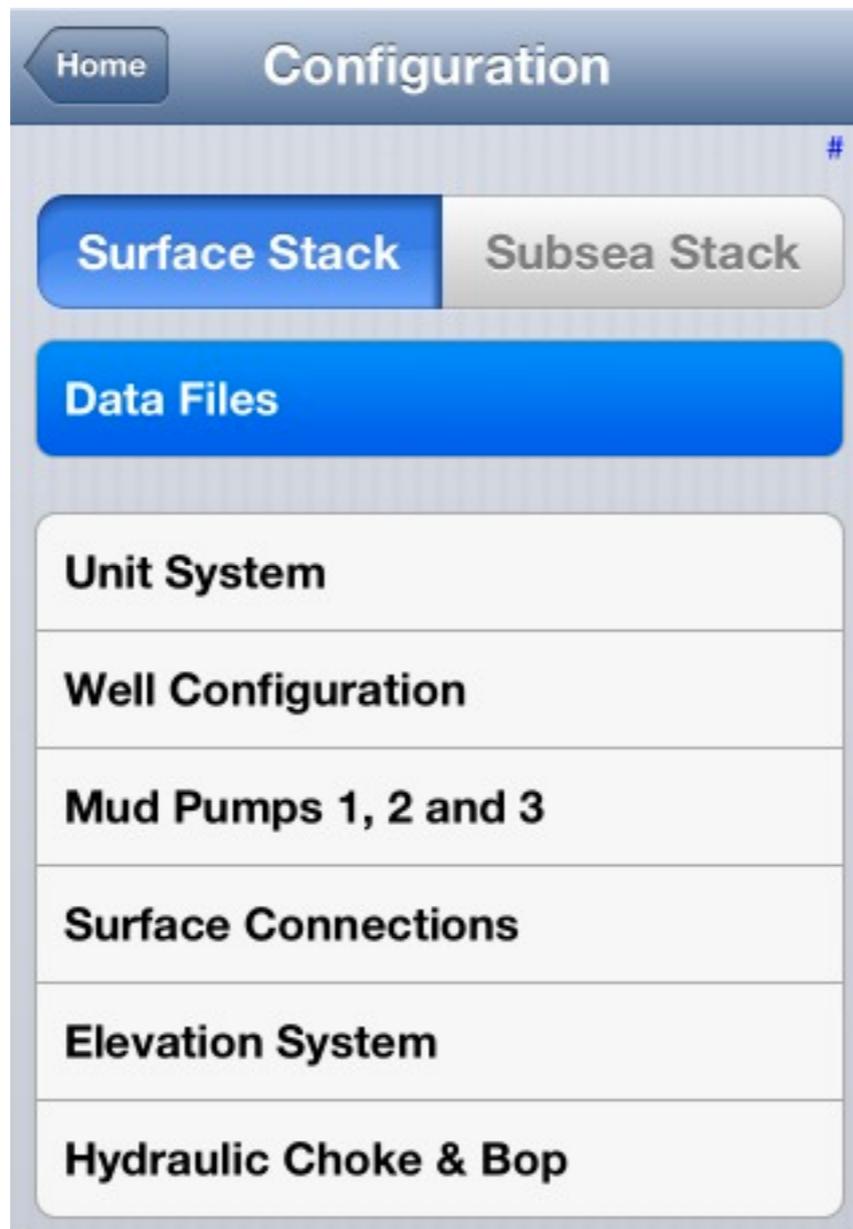
iPhone on vertical position

Visible when a data file is selected

**Surface Stack:**  
Land rig  
and Jack-up

**Subsea Stack:**  
Semi-submersible  
and Drillship  
(floating rigs)





Data Files Interface

iCloud Settings

Data Files on iCloud

Creating a New Data File

Saving the New Data File

Default Surface Stack

Default Subsea Stack

Opening a Data File

Saving a Data File

Removing a Data File

Sending a Data File by Email

The screenshot shows the 'Data Files Interface' on an iPod Touch. The interface includes a top navigation bar with 'Configuration', 'iCloud', and 'On My Device' buttons. Below this is an 'Import from other App on iCloud' section with a green arrow icon. A text input field contains 'Default Subsea Stack' and a 'Save' button. A list of data files is shown, with 'Default Subsea Stack' selected and highlighted in blue. Below the list, the current data file is identified as 'Local: Default Subsea Stack.dsdf'. At the bottom, there are three action buttons: 'Remove' (with a red 'X' icon), 'Email' (with an envelope icon and a green arrow), and 'Open' (with a green checkmark icon). Two larger buttons at the very bottom are 'Default Surface' and 'Default Subsea'. Red arrows point from text labels to these various elements.

back to main menu →

← Select local option

← Import from other apps

Edit file name →

← Save data file

← Select data file

Current data file (selected) →

← Open data file

Remove data file →

← Default subsea data file

Default landing data file →

Send data file by email

It's recommended first create a data file for work with this app => The "Save" button is enabled on views.  
But this is unnecessary because this app uses data in the ram memory. The data can be saved on any time.

First, use the Local Option for create data files for better performance and later to save it on iCloud.

for iCloud unavailable

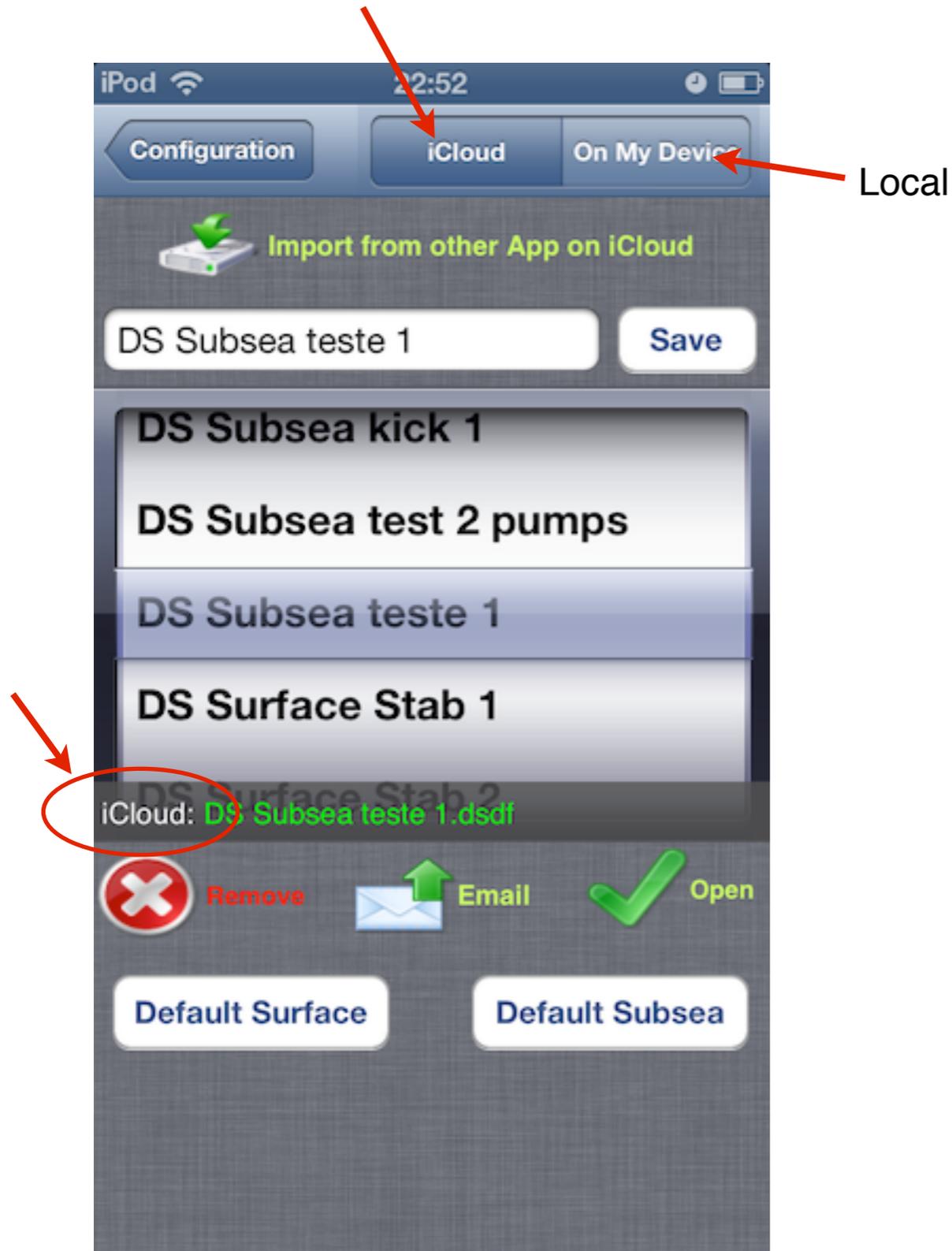


Check iCloud Configuration: **Settings => iCloud**

**Documents & Data must be ON**

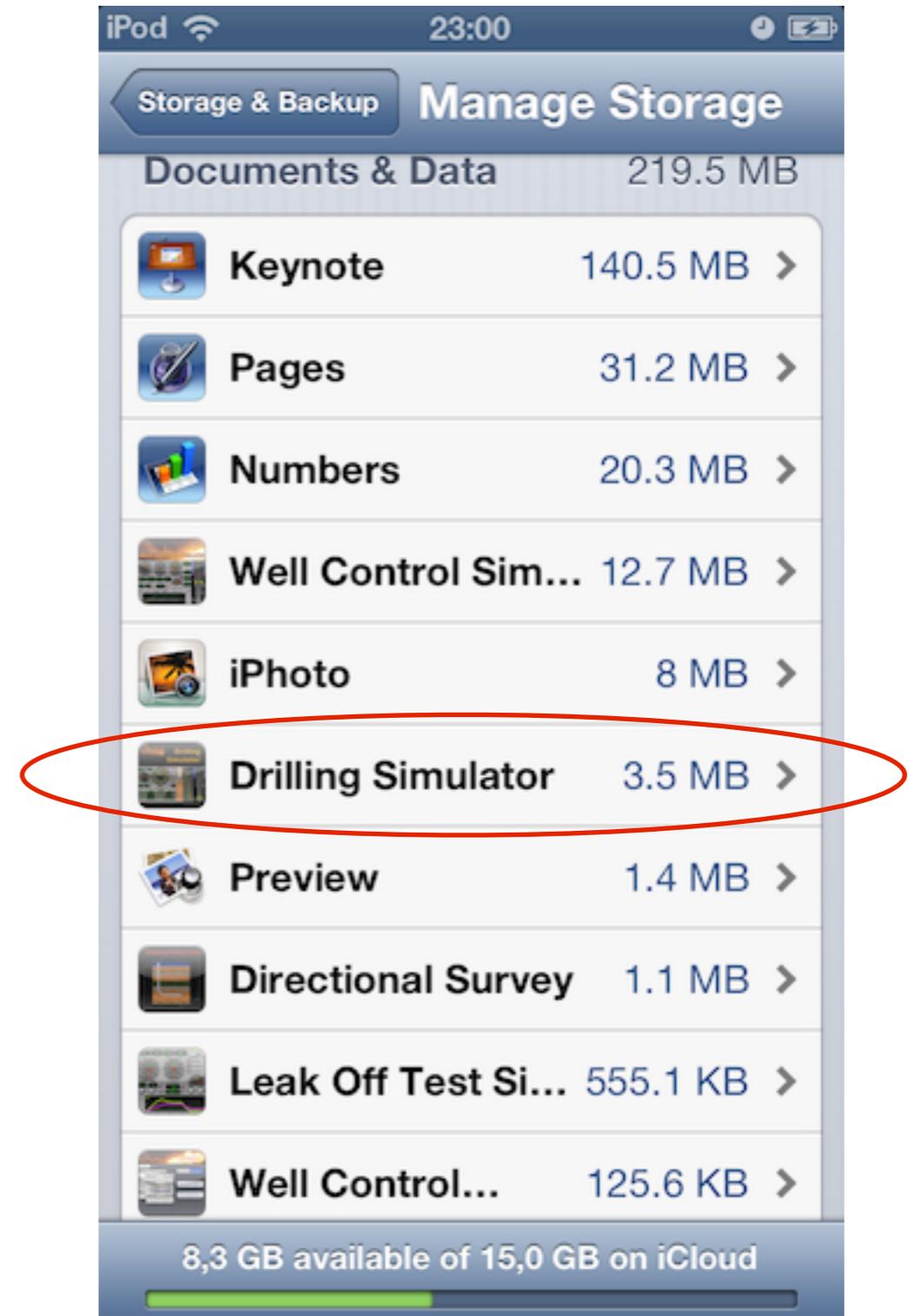


If iCloud is available on iPhone:



After create any data file in iCloud:

**Settings => Storage & Backup => Manage Storage**

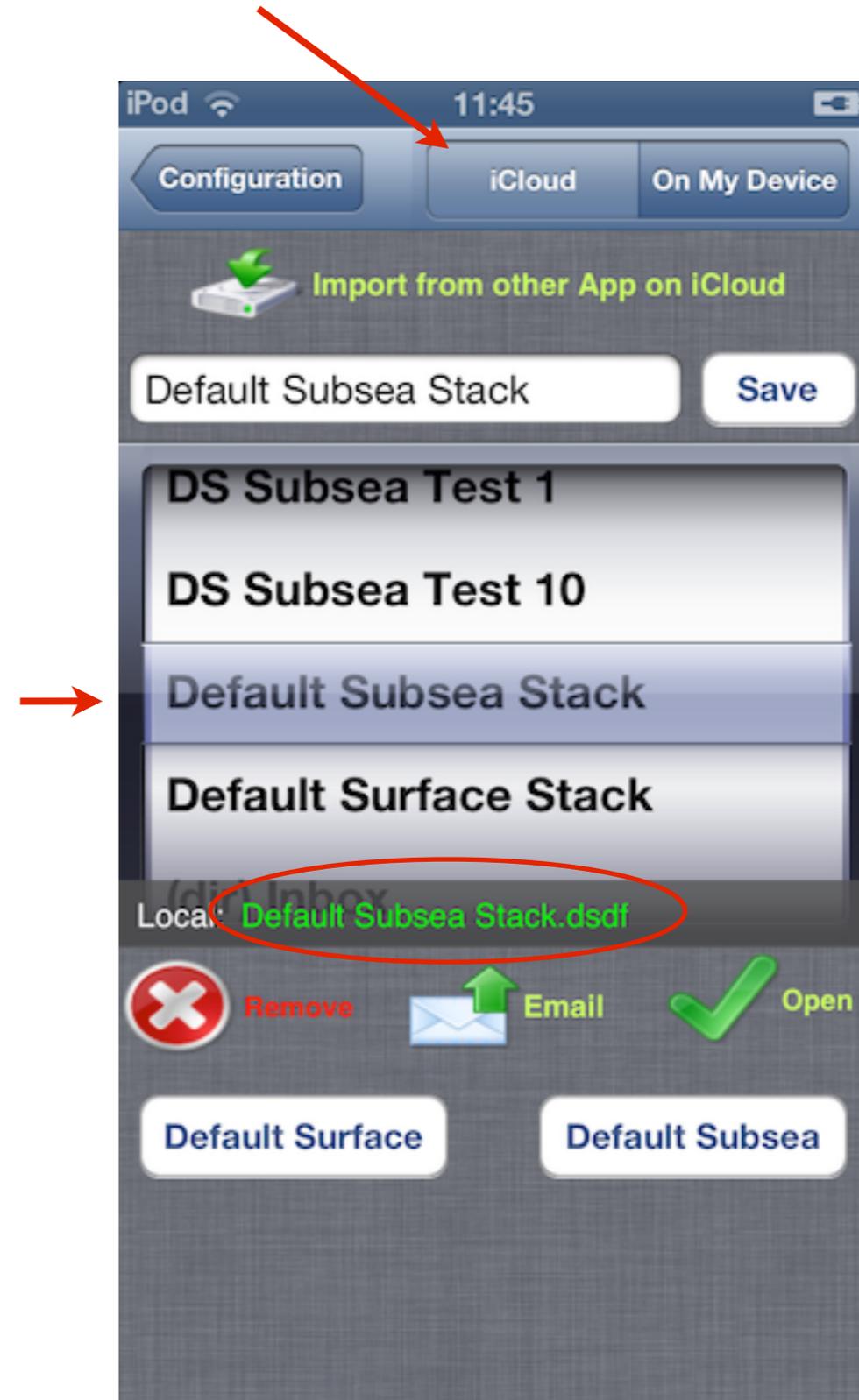
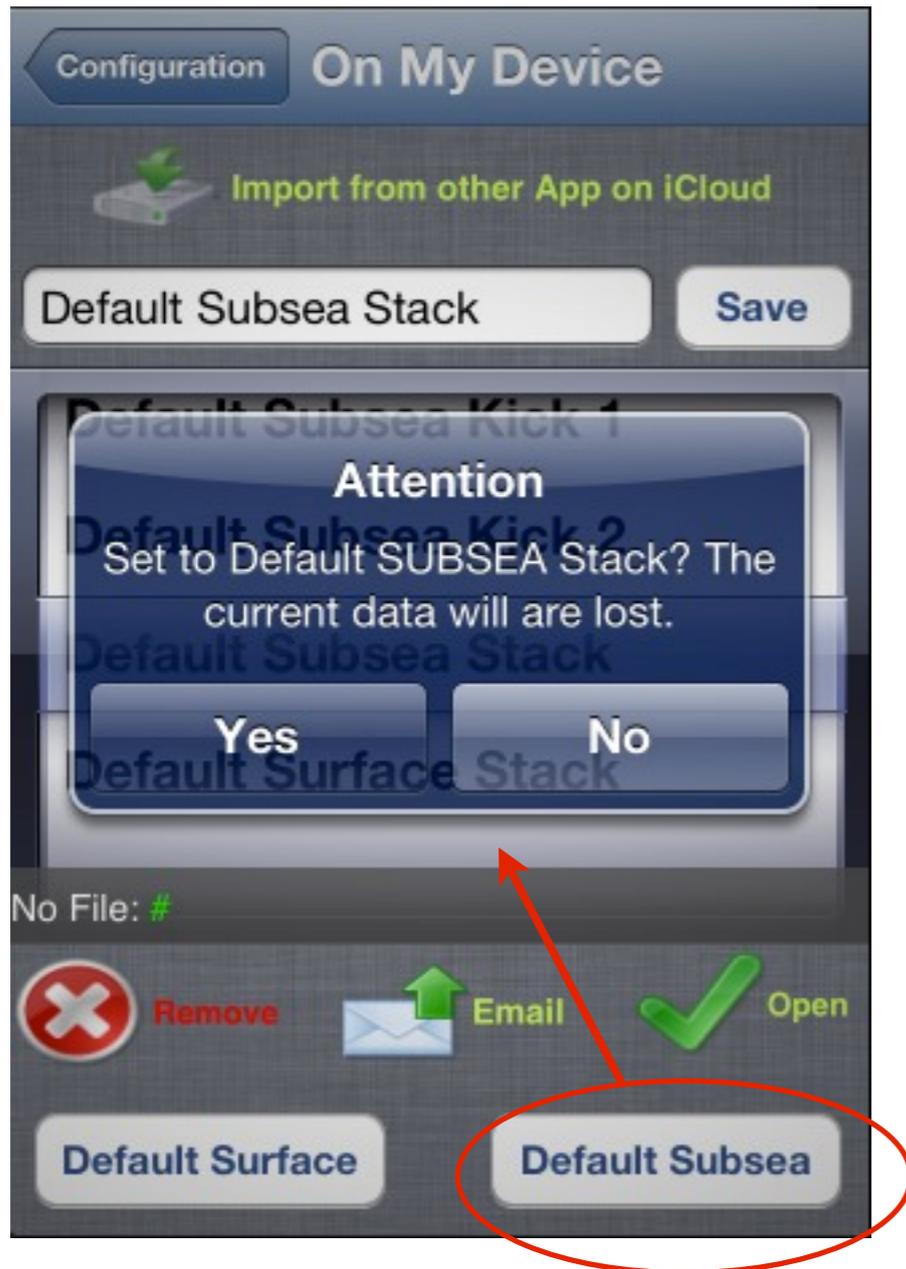


This application needs a complete well to work. For create a new Data File, select a default well on buttons “**Default Surface**” or “**Default Subsea**”

**File extension:**

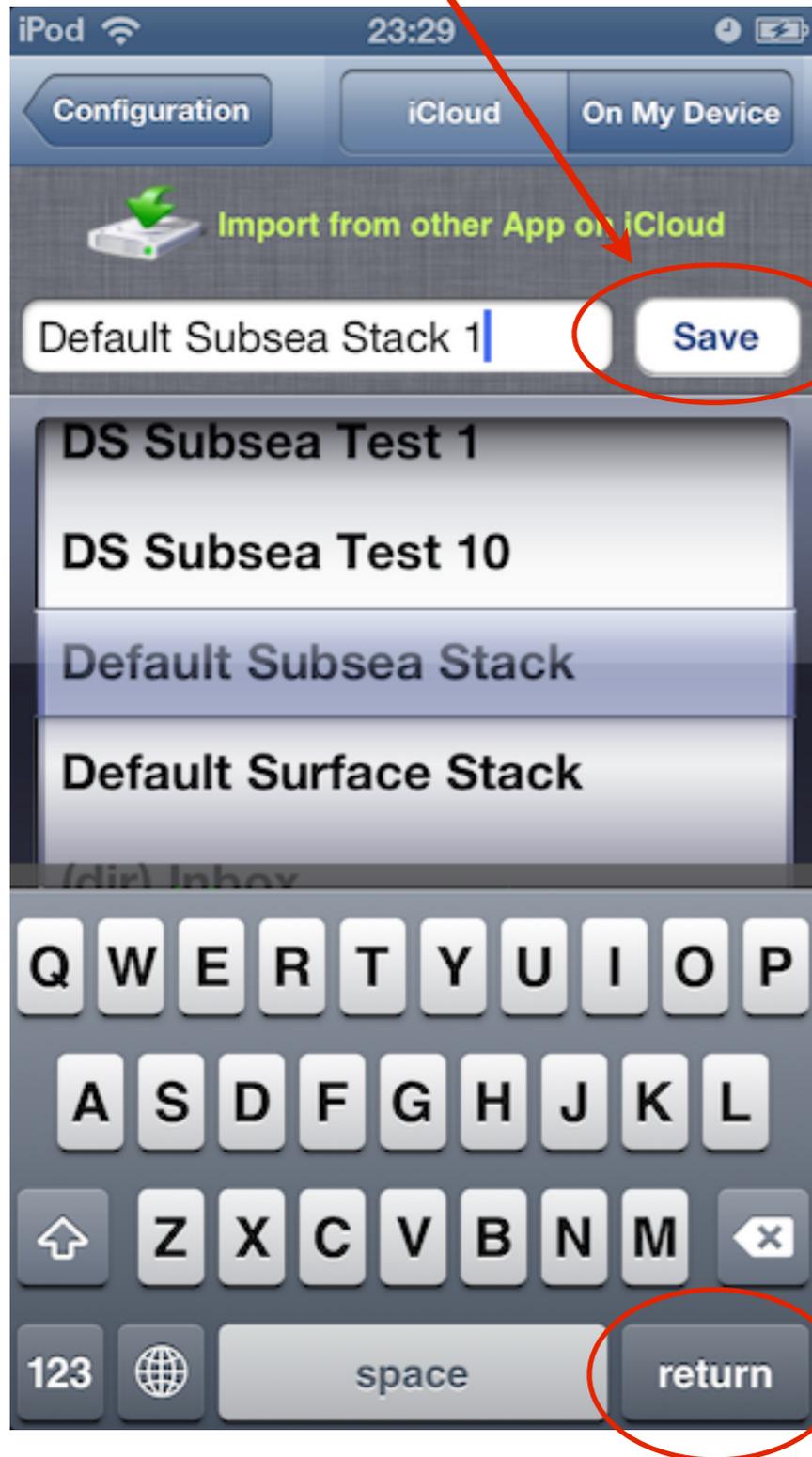
This application uses the file extension \*.**dsdf** (Drilling Simulator Data File). The user does not need to edit this extension.

The data file is saved with the default name (ex. **Default Subsea Stack**) on **iCloud** or **On My Device** according to the selected option.

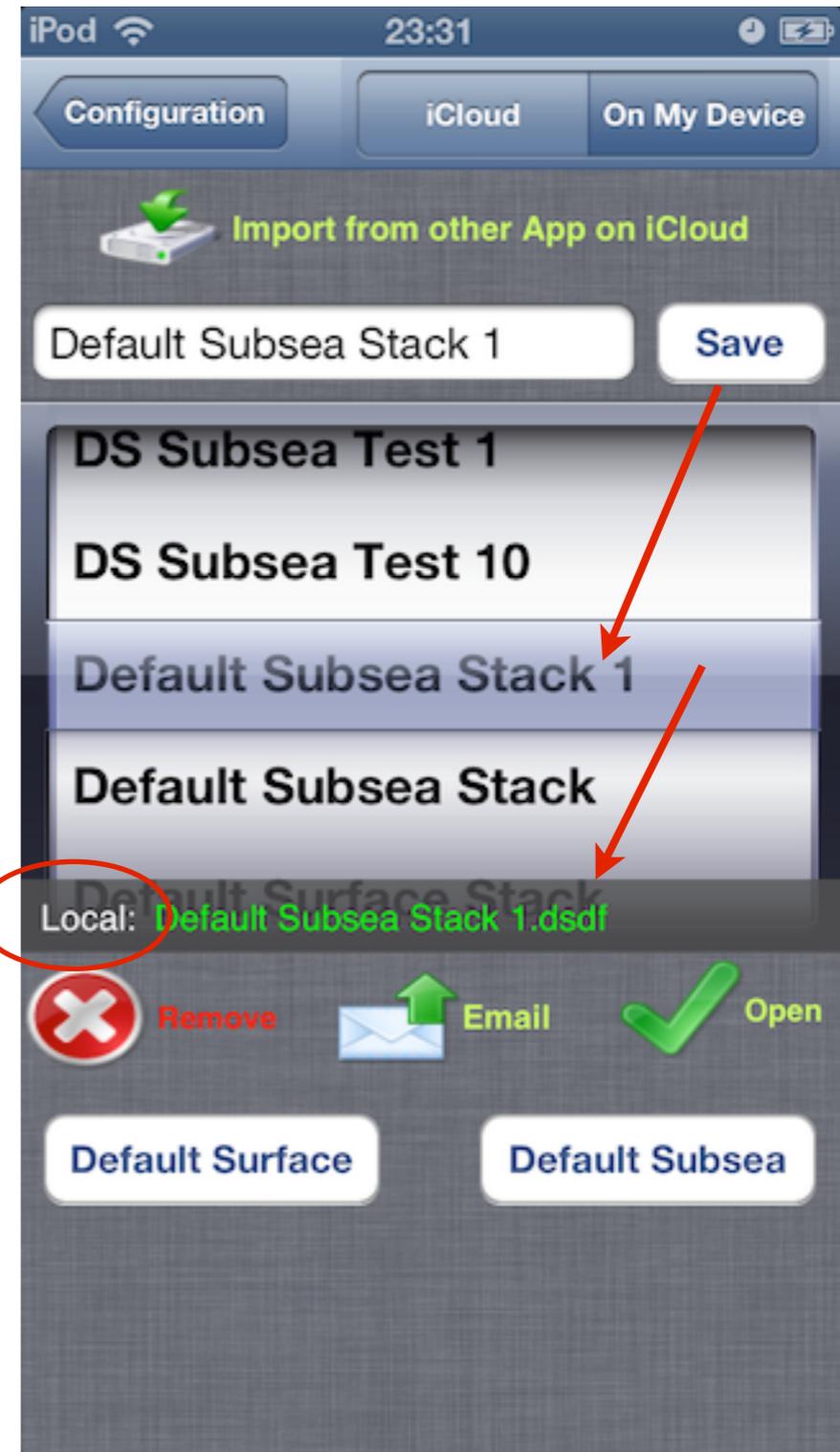


Save the data file with other name. Input the file name and Tap on "Save" button

The new data file is saved on iCloud or On My Device according to the selected option.



iCloud  
Local  
No File



Local → On My Device

Well Configuration

Vertical Directional Liner

Casing ID 8.7550 in  
 Hole size 8.5000 in  
 Csg shoe 2296.59 ft  
 Well depth 3937.01 ft

	Cap Int bbl/ft	Length ft	Volume * bbl
Casing	0.0745	2296.59	156.03
Liner			
Hole	0.0702	1640.42	85.65
<b>Total</b>	<b>w/o steel</b>	<b>w/ steel</b>	<b>241.68</b>

Strokes w/ Surface to Bit 630  
 Bit to Shoe 660  
 Bit to Surface 1817

MP 1 MP 2

Drill String Bit Grad Mud Forms

Drill String

Length Weight Email

	Length ft	O.D. in	I.D. in
DP1	2985.56	5.0000	4.2760
DP2	0.00	5.0000	4.2760
HW	328.08	5.0000	3.0000
DC1	459.32	6.2500	2.8125
DC2	164.04	6.7500	2.8125

bit depth: 3937.01 well depth: 3937.01

Int Steel Riser Cas Liner Hole

	Cap bbl/ft	Length ft	Volume bbl
DP1	0.0459	688.98	31.63
DP2	0.0459		
HW	0.0459	328.08	15.06
DC1	0.0322	459.32	14.81
DC2	0.0259	164.04	4.25
<b>Total</b>		<b>1640.42</b>	<b>65.75</b>

Drill Bit

Bit TFA By Email

Nozzles Fixed TFA 0.3313 sq.in

Coeff 0.9500 (1/32) in cm  
 Qty. 1 Size 12 9.5250

1 12 9.5250

1 12 9.5250

0 0 0.0000

Note: screenshots with iPhone 4

Gradients

Back Grad. Email Temperature

$\rho_{\text{absorption}}$  12.0 ppg 0.6234 psi/ft

$\rho_{\text{fracture}}$  12.0 ppg 0.6234 psi/ft

Porosity 35.0 %

Permeability 300 md

Shoe Depth Hydrost. 1145.3 psi

Absorption Pressure 1431.6 psi

Fracture Pressure 1431.6 psi

Temperature Gradient

Grad. Temp Gradient Email

Temp grad 1.400 F/100ft

Surf Temp 28.0 °C 82.4 °F 301.1 K

Bottom Hole Temperature 58.6 °C

137.5 °F

331.8 K

597.2 R

Mud

Back Email Volumes Calcs

Mud Weight 9.60 ppg

Mud weight Gradient 0.4987 psi/ft

Plastic Viscosity 15.0 cP

Yield Point 10.0 lb/100ft<sup>2</sup>

Initial Gel 5.0 lb/100ft<sup>2</sup>

Rheological Model Power Bingham

Buoyancy Factor 0.8534

Shoe Depth Hydrost. 1145.3 psi

Fracture Pressure 1431.6 psi

Bottom Hole Hydrost. 1963.4 psi

Mud Pumps

Configura... **Mud Pump 1** Pumps 2/3

Liner diameter  in

Max Pressure  psi

Piston Length  in

Piston diameter  in

Power  hp

Efficiency  %

Type  Triplex  Duplex

Discharge volume  bbl/stk  
(true pump output)

gal/stk

Maximum Speed  spm



Surface Connections

Configuration **Surface** Email

Connections	Length ft	I.D in
Standpipe	<input type="text" value="49.21"/>	<input type="text" value="4.0000"/>
Mud Hose	<input type="text" value="59.06"/>	<input type="text" value="3.0000"/>
Swivel / TD	<input type="text" value="6.6"/>	<input type="text" value="3.0000"/>
Kelly / Stands	<input type="text" value="42.7"/>	<input type="text" value="4.0000"/>
Volume *	<input type="text" value="2.00"/> bbl	

\* Volume included on drill string strokes calculations.

Elevation System

Configuration **Elevation** Email

Drilling Elevation System Weight

kips

Drill String Nominal Weight  kips  
 w/ Buoyancy  kips

Hook Load  kips

Well Configuration

Vertical Directional Liner

Water depth: 3280.8 Air Gap: 82.02  
 Riser ID: 19.7500 C/K ID: 3.0000  
 Casing ID: 12.4150 in  
 Hole size: 8.5000 in  
 Csg shoe: 5905.51 ft  
 Well MD: 9842.52 ft

strokes	Cap Int bbl/ft	Length ft	Volume * bbl
CL/KL	0.0087	3362.86	29.40
Riser	0.3789	3362.86	1250.08
Casing	0.1497	2214.57	316.54
Liner	0.0745	1968.50	133.74
Hole	0.0702	2296.59	126.64
<b>Total</b>	<b>w/o steel</b>	<b>w/ steel</b>	<b>1885.81</b>

Drill String Bit Grad Mud Forms

Drill String

Length Weight Email

	Length ft	O.D. in	I.D. in
DP1	4265.09	5.5000	4.7780
DP2	4593.18	5.0000	4.2760
HW	328.08	5.0000	3.0000
DC1	492.13	6.2500	2.8125
DC2	164.04	6.7500	2.8125

bit depth: 9842.52 well depth: 9842.52

Int	Steel	Riser	Cas	Liner	Hole
	Cap	Length	Volume		
	bbl/ft	ft	bbl		
DP1	0.0408				
DP2	0.0459	1312.34	60.24		
HW	0.0459	328.08	15.06		
DC1	0.0322	492.13	15.87		
DC2	0.0259	164.04	4.25		
<b>Total</b>		<b>2296.59</b>	<b>95.42</b>		

Drill String Weight

Nominal: 257.05 kips  
 w/ Buoyancy: 219.38 kips  
 Hook Load: 339.38 kips

Liner

Back Liner Email

without Liner with Liner

Top: 5577.43 ft  
 Shoe: 7545.93 ft  
 Liner OD: 9.6750 in  
 Liner ID: 8.7550 in

Liner	Ann Cap bbl/ft	Length ft	Volume bbl
DP1			
DP2	0.0502	1968.50	98.77
HW			
DC1			
DC2			
<b>Total</b>		<b>1968.50</b>	<b>98.77</b>

Note: screenshots with iPhone 5

Gradients

Back Grad. Email Temperature

$\rho$  absorption 12.0 ppg 0.6234 psi/ft

$\rho$  fracture 12.0 ppg 0.6234 psi/ft

Porosity 35.0 %

Permeability 300 md

Shoe Depth Hydrost. 3763.2 psi

Absorption Pressure 4704.0 psi

Fracture Pressure 4704.0 psi

Temperature Gradient

Grad. Temp Gradient Email

Temp grad 1.400 F/100ft

Surf Temp 28.0 °C 82.4 °F 301.1 K

Sea Temp 4.0 °C 39.2 °F 277.1 K

Bottom Hole Temperature 54.4 °C

129.9 °F

327.5 K

589.6 R

Mud

Back Email Volumes Calcs

Mud Weight 9.60 ppg

Mud weight Gradient 0.4987 psi/ft

Plastic Viscosity 15.0 cP

Yield Point 10.0 lb/100ft2

Initial Gel 5.0 lb/100ft2

Rheological Model Power Bingham

Buoyancy Factor 0.8534

Shoe Depth Hydrost. 3763.2 psi

Fracture Pressure 4704.0 psi

Bottom Hole Hydrost. 4908.5 psi

Mud Pumps

Configura... **Mud Pump 1** Pumps 2/3

Liner diameter  in

Max Pressure  psi

Piston Length  in

Piston diameter  in

Power  hp

Efficiency  %

Type  Triplex  Duplex

Discharge volume  bbl/stk  
(true pump output)  gal/stk

Maximum Speed  spm



Surface Connections

Configuration **Surface** Email

Connections	Length ft	I.D in
Standpipe	<input type="text" value="49.21"/>	<input type="text" value="4.0000"/>
Mud Hose	<input type="text" value="59.06"/>	<input type="text" value="3.0000"/>
Swivel / TD	<input type="text" value="6.6"/>	<input type="text" value="3.0000"/>
Kelly / Stands	<input type="text" value="42.7"/>	<input type="text" value="4.0000"/>
Volume *	<input type="text" value="2.00"/> bbl	

\* Volume included on drill string strokes calculations.

Elevation System

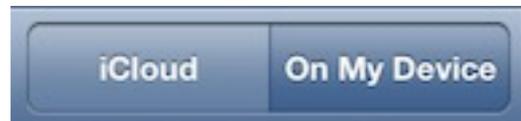
Configuration **Elevation** Email

Drilling Elevation System Weight

kips

Drill String Nominal Weight  kips  
w/ Buoyancy  kips

Hook Load  kips



When TAP on “**Open**” button, the data that is on the Data File Highlighted on Wheel is loaded in the RAM memory and can be saved with other file name.

#### Method to transfer data file between iCloud and Local:

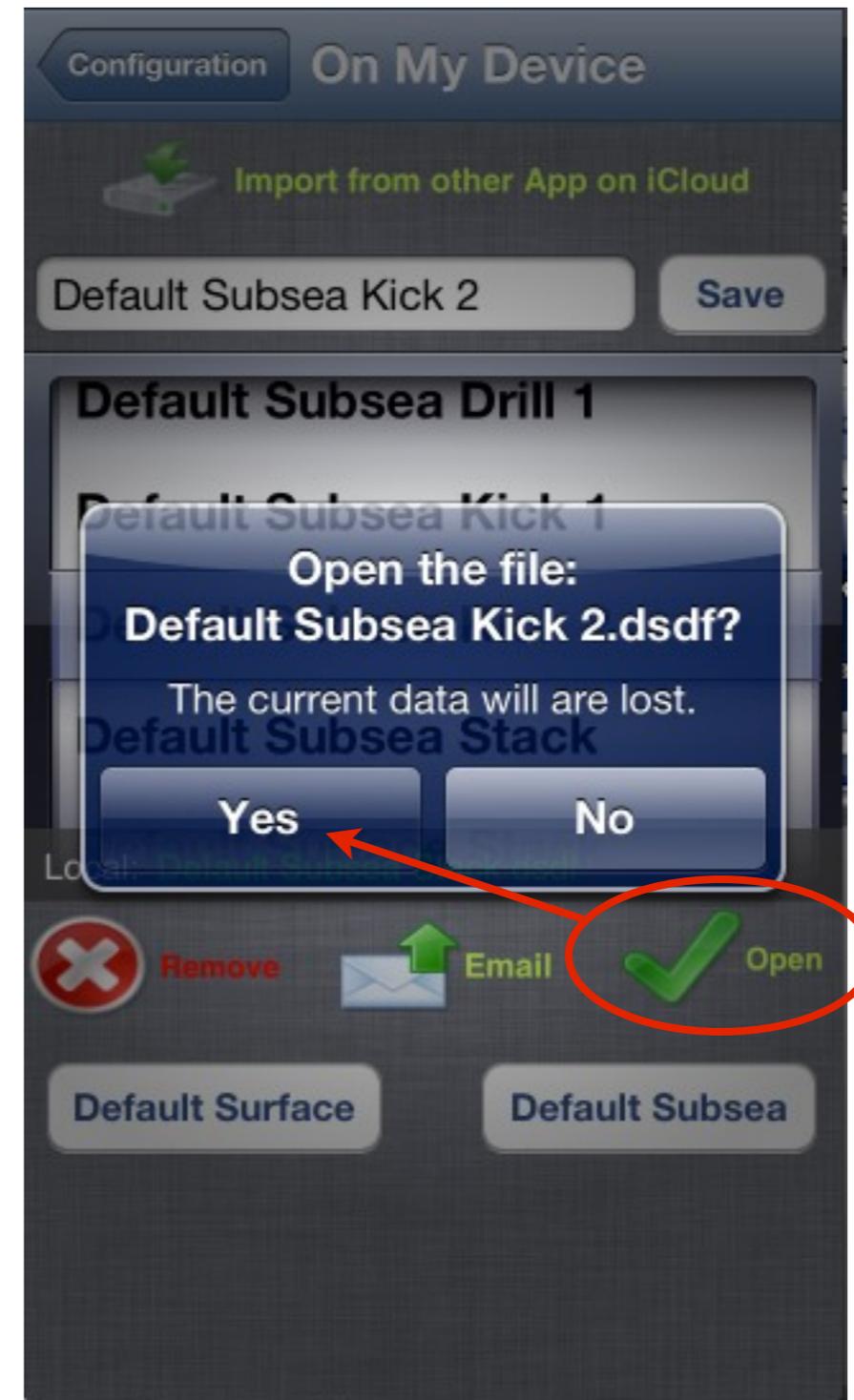
The user can open a data file on **Local (On My Device)** and after save it on iCloud or the opposite.

#### iCloud Message:



On the first time that the user taps on “**Open**” button, the download of the data file is started from the iCloud to a local address with internal access only. When the download is completed, it's possible open the data file.

The user must tap again on the “**Open**” button for checking. When OK, the data file is loaded in RAM memory and shown on the well schematic.



When TAP on “**Save**” button the data that are loaded in the RAM memory is saved to the data file named with the content of the File Name TextBox.

The data file is created in **iCloud** or **Local (On My Device)** according to the selected option.



### Recommendation

Save your exercise with different filenames at the points of interest for analyzes later.

When the status is “No File”: “#”, the data loaded not been saved but remain in ram memory.

No File: #

Select the data file and Tap on “**Remove**” button.



Tap on “**Yes**” button to confirm.

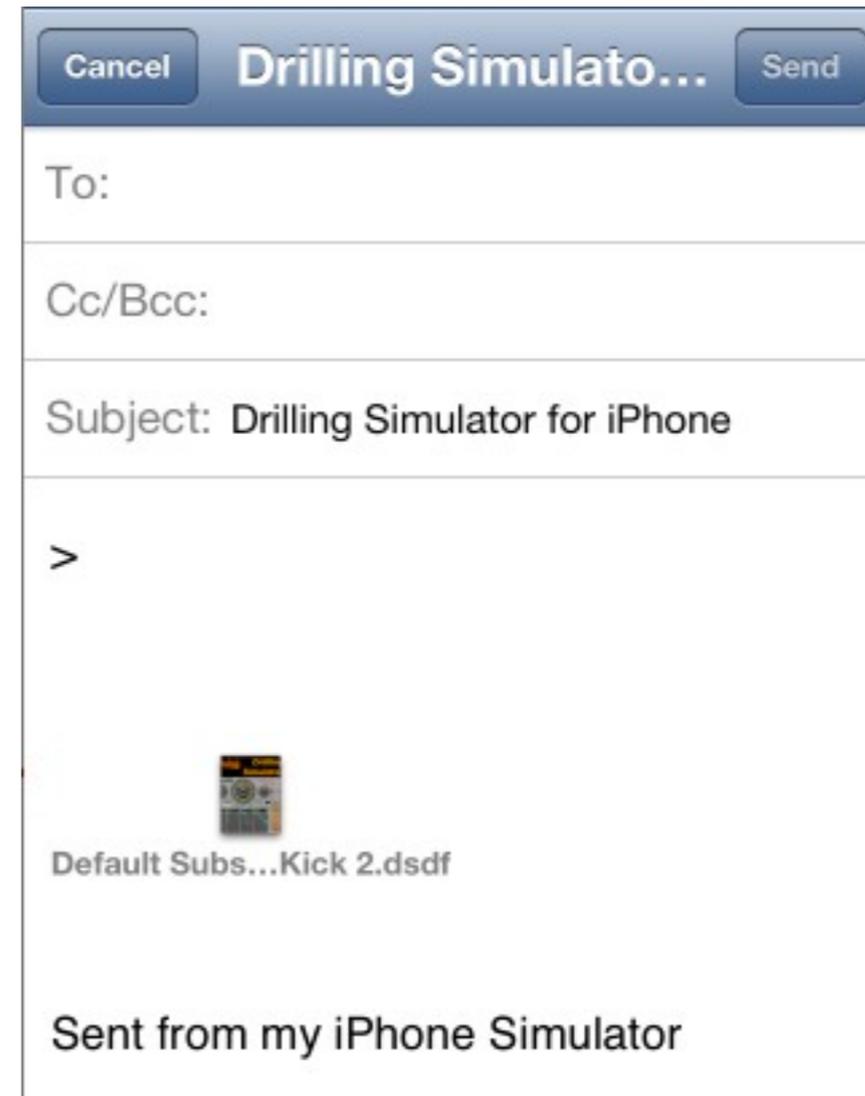


**Attention:**

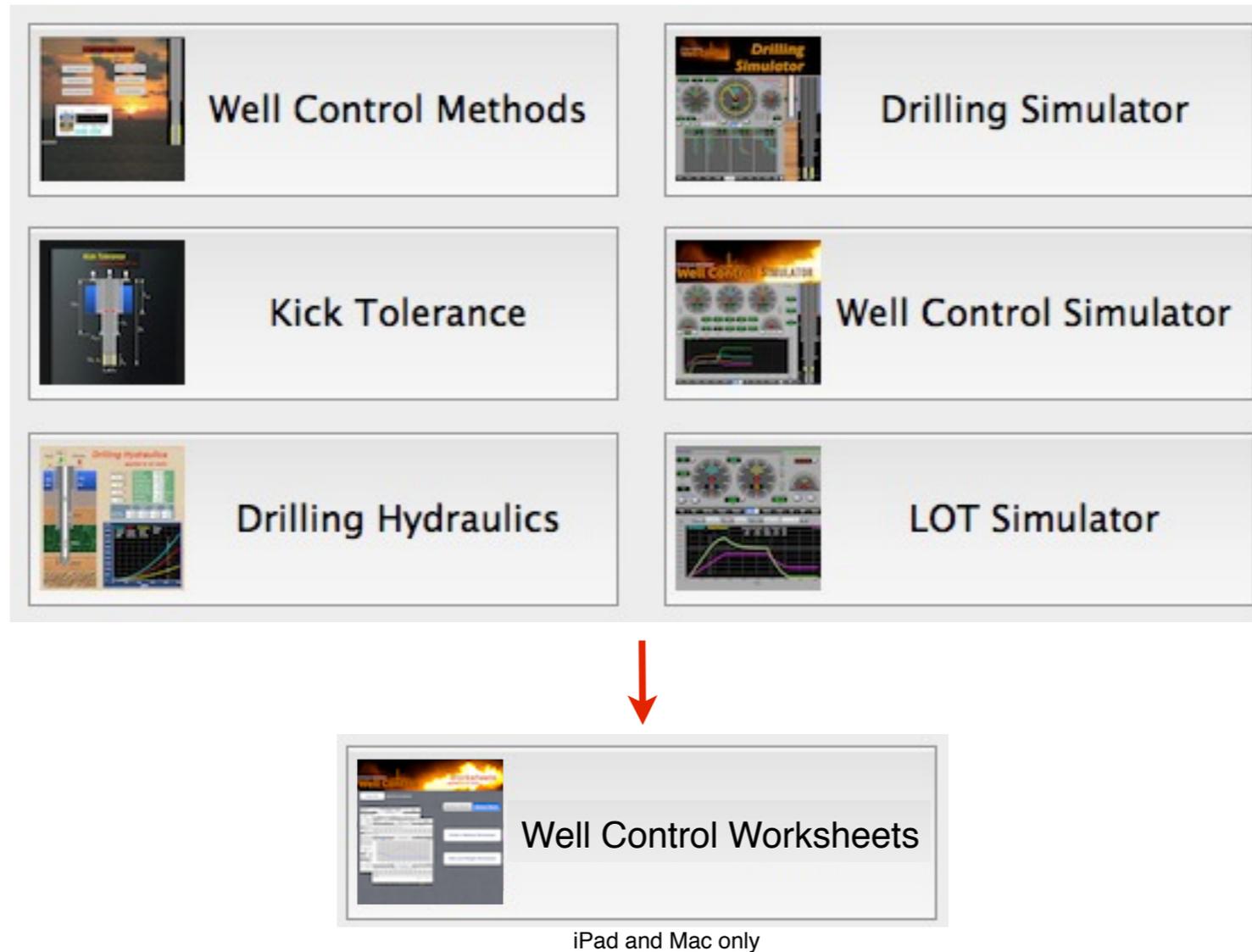
When a data file is removed, the data is lost.

Select the data file and TAP on “**Email**” button.

In the email view, fill the fields of the email header and edit the email text if necessary. Tap on “**Send**” or “**Cancel**” button.



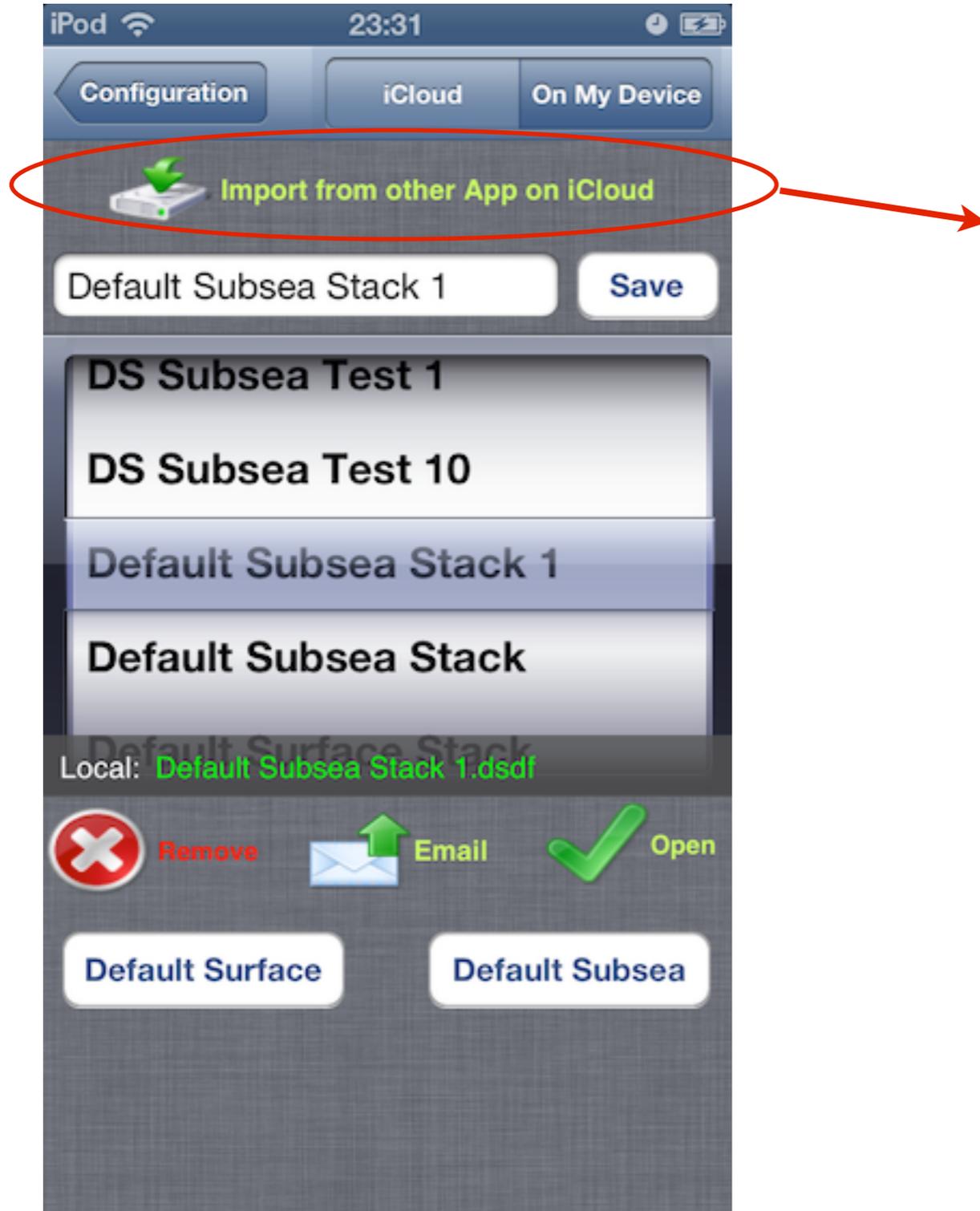
In this time, the follow apps can to share the same well data and also some operational parameters.



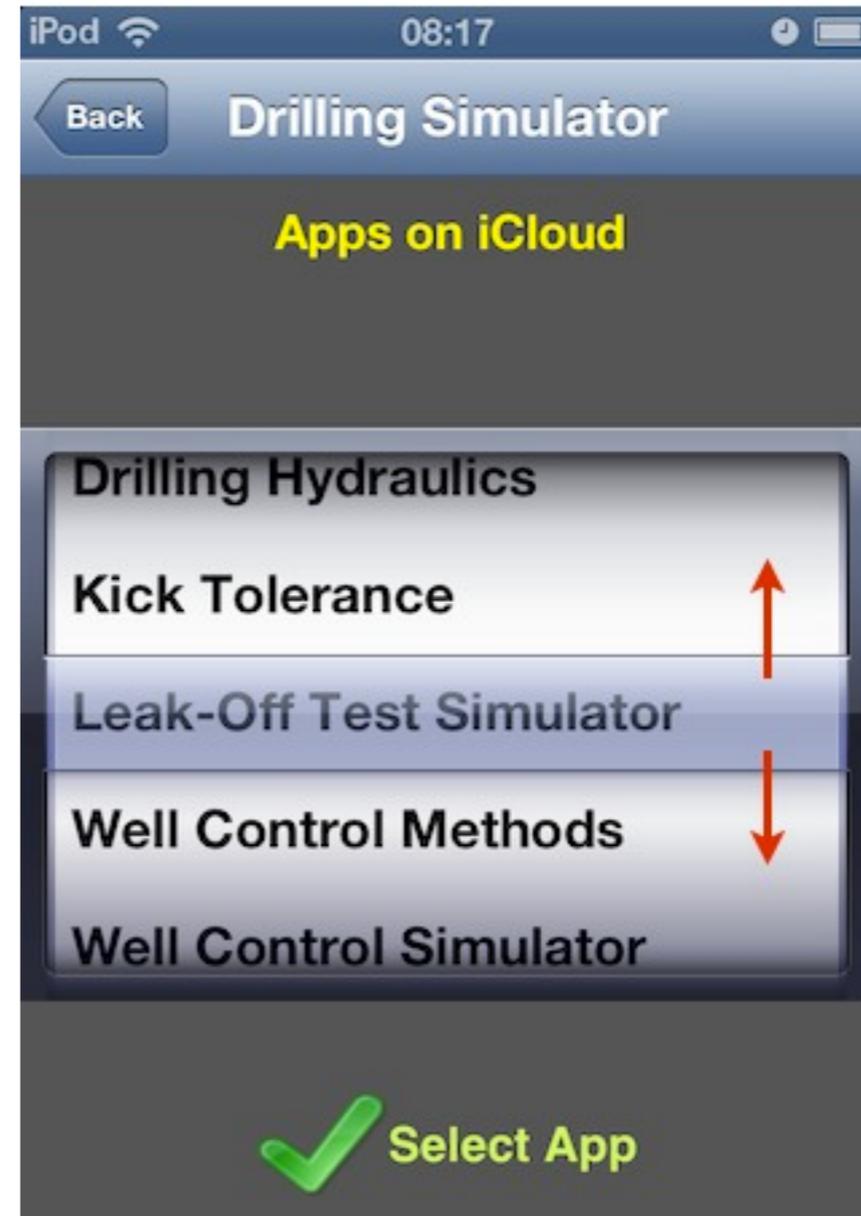
**Notes:**

- The well data is common for the 6 apps (Well Control Methods, Kick Tolerance, Drilling Hydraulics, Drilling Simulator, Well Control Simulator and Leak-Off Test Simulator).
- The Drilling Simulator and Well Control Simulator have the same parameters. They have some exclusive parameters (drill string pipe weight, etc).
- The Drilling Hydraulics has exclusively the parameters: mup pumps #3 and #4 and drilling motor.
- The Well Control Worksheets only import data from other apps to fill the kill sheets.

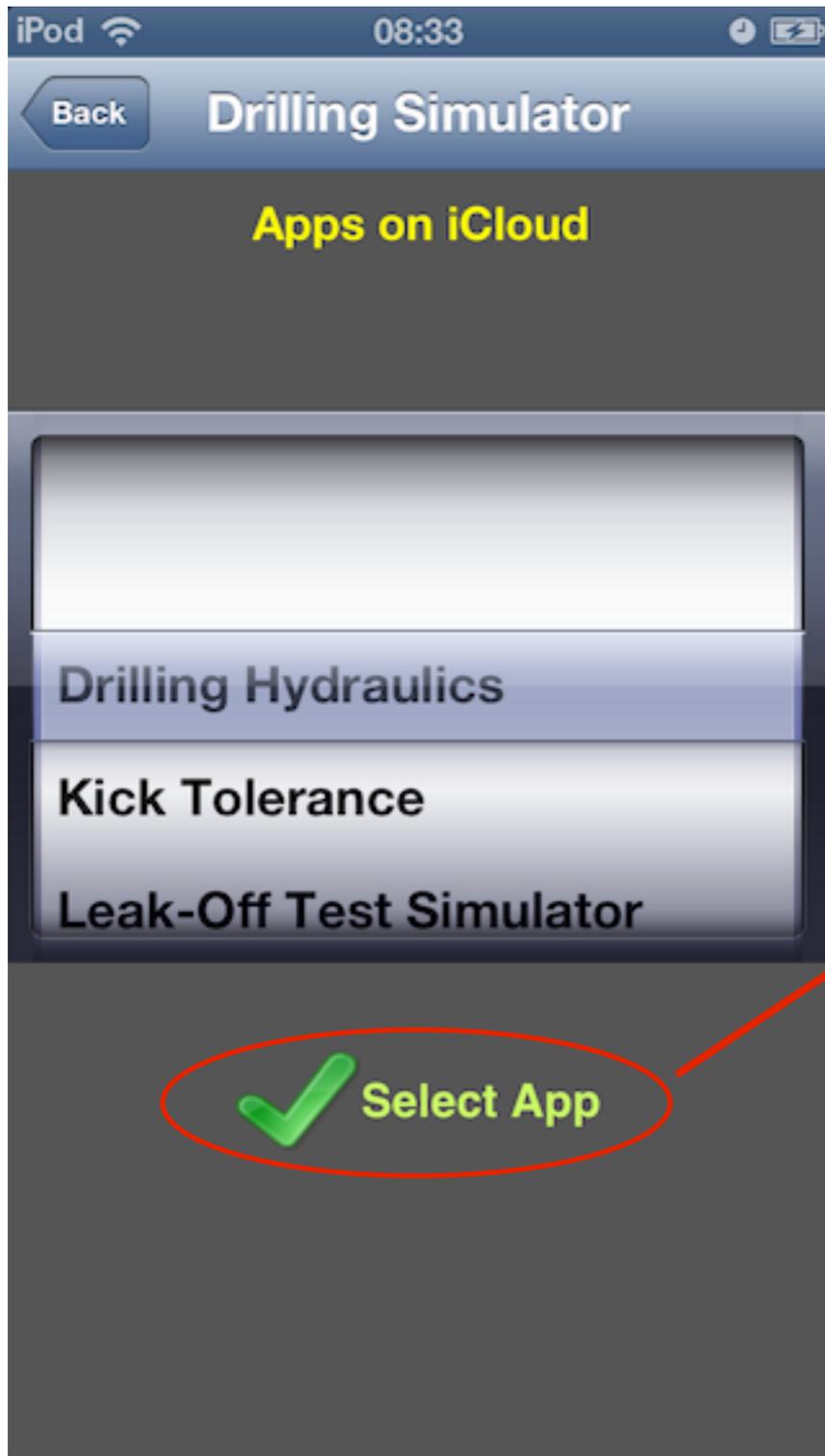
In this example, we will import data from **Drilling Hydraulics** App. Tap on “**Import from Other Apps on iCloud**” button.



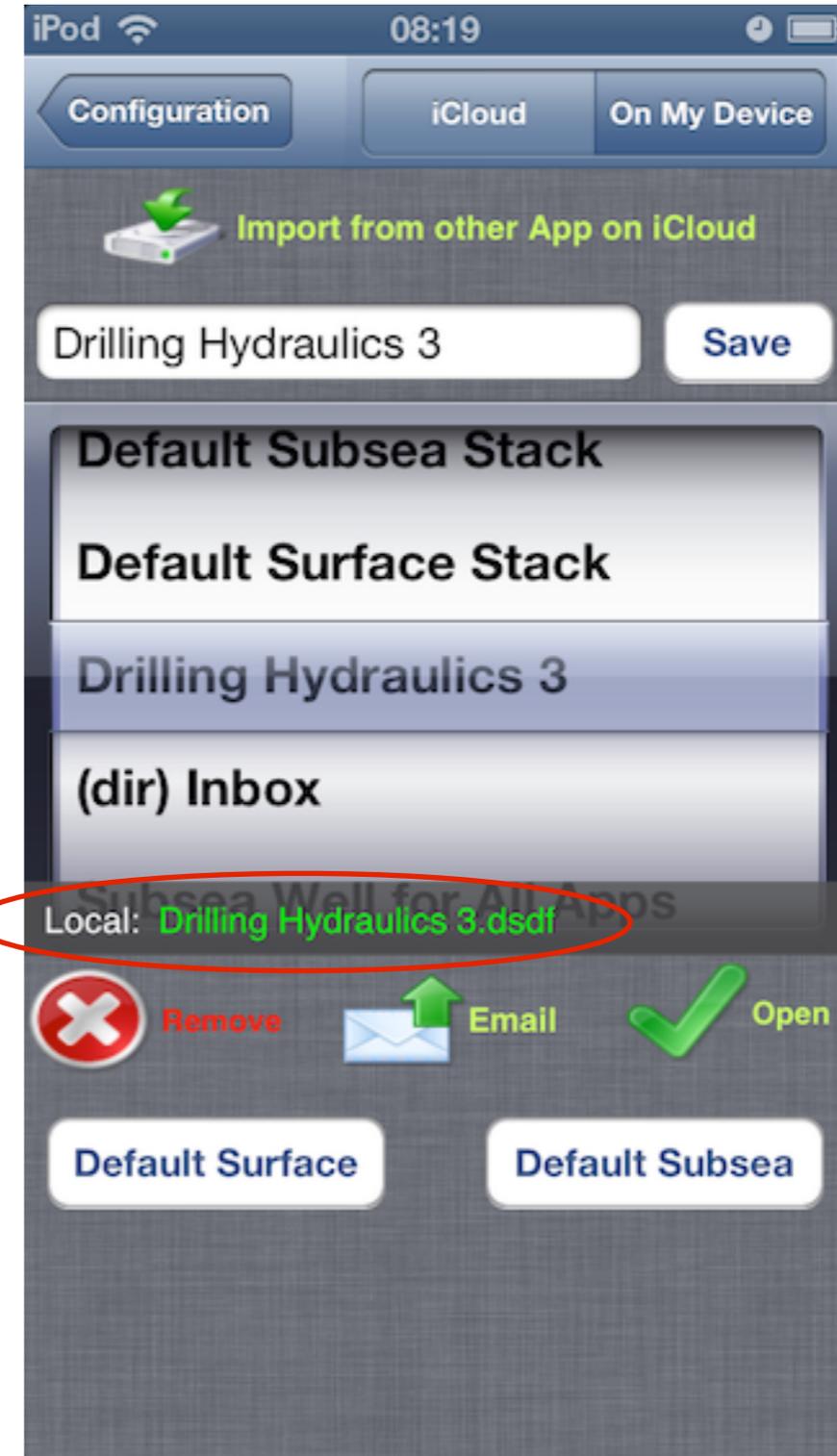
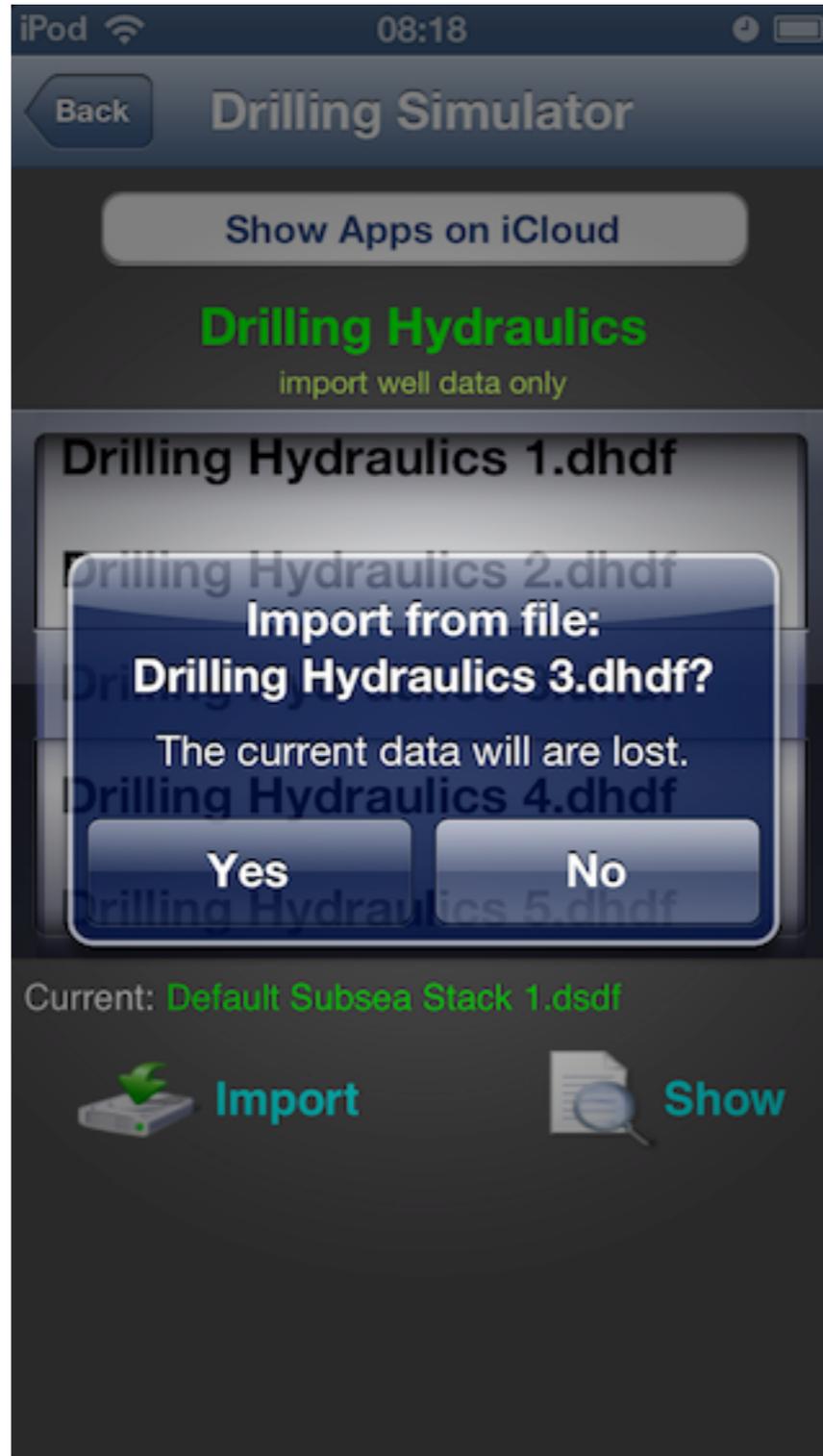
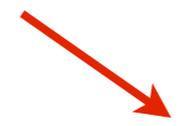
The apps on the User iCloud are listed on the data wheel. Select the App to list the data files.



Select the App to list the data files. Move the wheel up/down to select the data file and Tap on **“Import”** button.



After to import, the data file is saved with the same filename (\*.dsdf) on **iCloud** or **On My Device** according to the selected option.



Tap on "Show Apps on iCloud" to select other app or Tap on "Import from Other Apps on iCloud" button to close the popup view



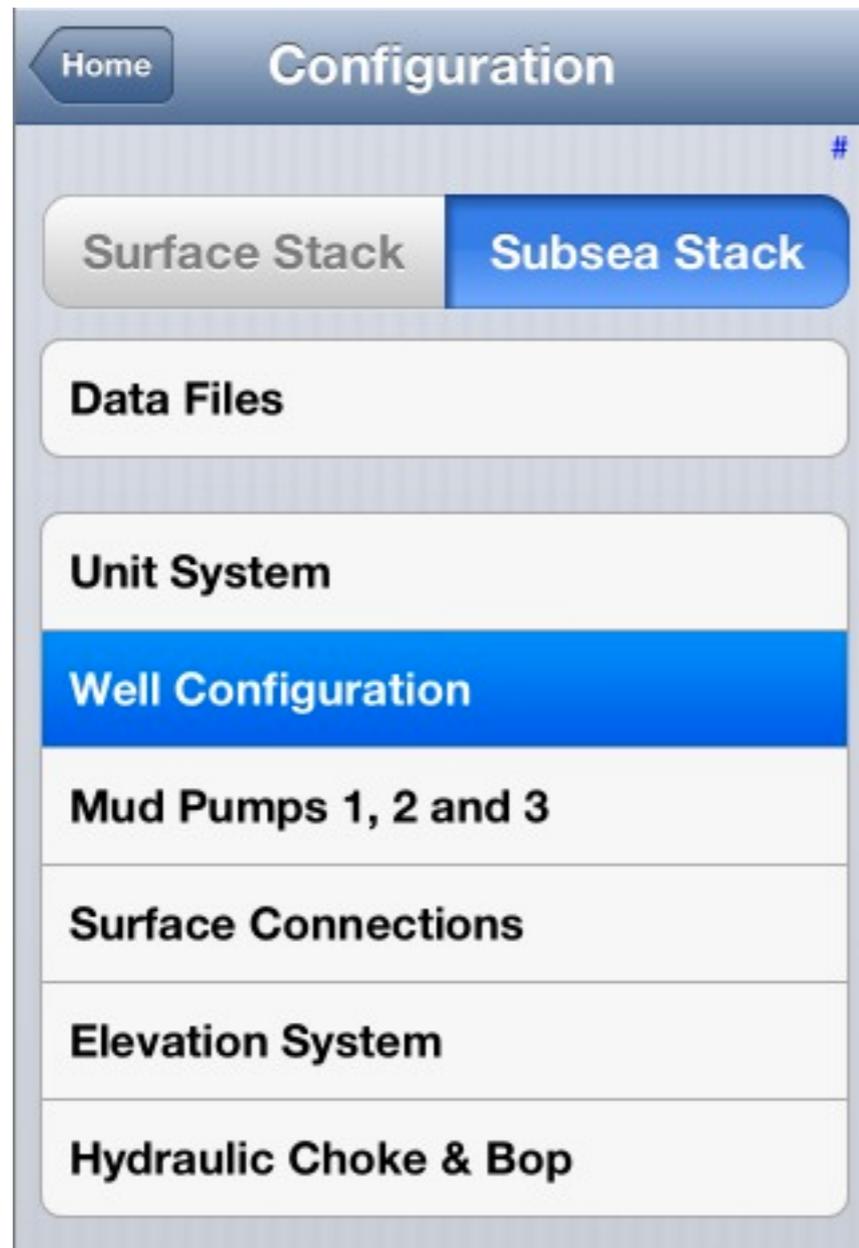
Select the 'Unit System' option:



Or select the unit for each parameter



On **Main View**, tap on “**Well**” button on toolbar to edit the Well Configuration.



### Well Configuration Interface

Well Types: Vertical x Directional

Well with Liner

Stack Types: Surface x Subsea

Drill String

Capacities & Volumes

Drill Bit

Gradients

Drilling Fluid (Mud)

Mud Volume

Surface Circulation Volume

Formations to Drill

Mud Pumps

Surface Connections

Elevation System

Hydraulics Choke and BOP

On **Main View**, tap on “**Well Configuration**” option to edit the Well Configuration.

Select well type: **Vertical** or **Directional**

The screenshot shows the Well Configuration interface with several annotations:

- back to main menu**: Points to the 'Confi...' button.
- Go to Liner view**: Points to the 'Liner' button.
- Select well type: Vertical or Directional**: Points to the 'Vertical' and 'Directional' buttons.
- Directional selected**: Points to the 'Directional' button.
- volume calculation according option selected**: Points to the 'Volume' column header in the table.
- select cap/vol or strokes calculations**: Points to the 'cap/vol' and 'strokes' tabs.
- go to drill string view**: Points to the 'Drill String' button.
- Go to formations view**: Points to the 'Forms' button.
- drill bit view**: Points to the 'Bit' button.
- gradients view**: Points to the 'Grad' button.
- mud view**: Points to the 'Mud' button.

**cap/vol Strokes w/ MP 1 MP 2**

Surface to Bit	1557
Bit to Shoe	798
Riser Annular	8784
Bit to BOP	3911
Choke Line	246
Bit to Choke	4157

**Well Configuration Parameters:**

- Water depth: 3280.8
- Riser ID: 18.7500
- Casing ID: 12.4150 in
- Hole size: 8.5000 in
- Csg shoe: 5905.51 ft
- Well MD: 9842.52 ft
- Air Gap: 82.02
- C/K ID: 3.0000
- KOP: 0.00
- TVD: 5905.51

**Volume Calculation Table:**

	Cap Int bbl/ft	Length ft	Volume bbl
CL/KL	0.0087	3362.86	29.40
Riser	0.3415	3362.86	1148.55
Casing	0.1497	2214.57	331.80
Liner	0.0745	1968.50	146.58
Hole	0.0702	2296.59	161.20
<b>Total</b>	<b>w/o steel</b>	<b>w/ steel</b>	<b>1846.74</b>

## Vertical Well

Conf...	Vertical	Directional	Liner
Water depth	3280.8	Air Gap	82.02
Riser ID	18.7500	C/K ID	3.0000
Casing ID	12.4150 in		
Hole size	8.5000 in		
Csg shoe	5905.51 ft		
Well MD	9842.52 ft		

## Directional Well

Conf...	Vertical	Directional	Liner
Water depth	3280.8	Air Gap	82.02
Riser ID	18.7500	C/K ID	3.0000
Casing ID	12.4150 in	KOP	0.00
Hole size	8.5000 in	TVD	
Csg shoe	5905.51 ft	5905.51	
Well MD	9842.52 ft	9842.52	

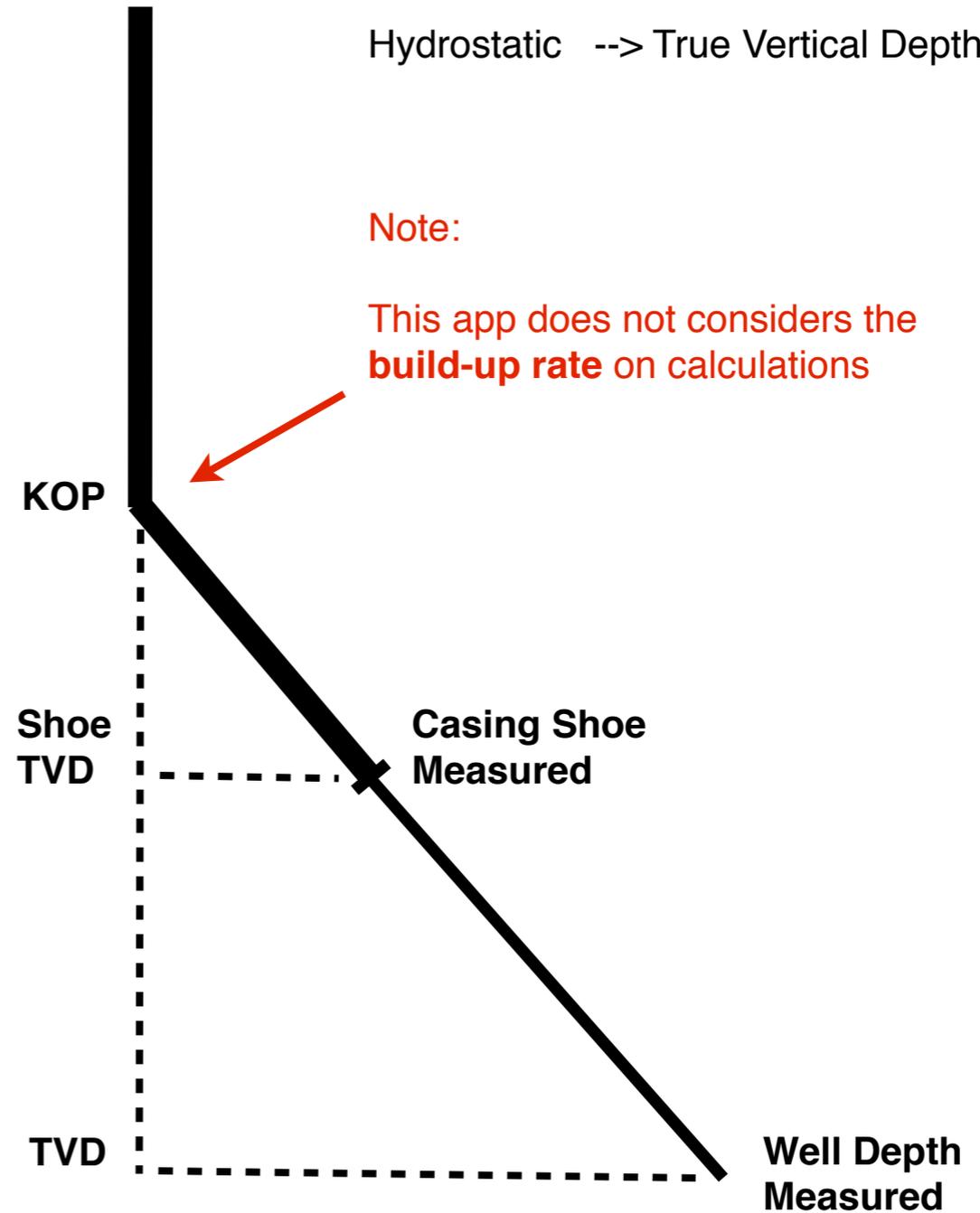
### Calculations:

Friction Loss --> Measured Depth

Hydrostatic --> True Vertical Depth

### Note:

This app does not consider the **build-up rate** on calculations



Tap "Liner" button on navigation bar to edit the liner parameters

without Liner with Liner

MD TVD

Top 5577.43 ft 5577.43

Shoe 7545.93 ft 7545.93

Liner OD 9.6750 in

Liner ID 8.7550 in

Liner	Ann Cap bbl/ft	Length ft	Volume bbl
DP1			
DP2			
HW			
DC1			
DC2			
Total		0.00	0.00

Without Liner

With Liner

without Liner with Liner

MD TVD

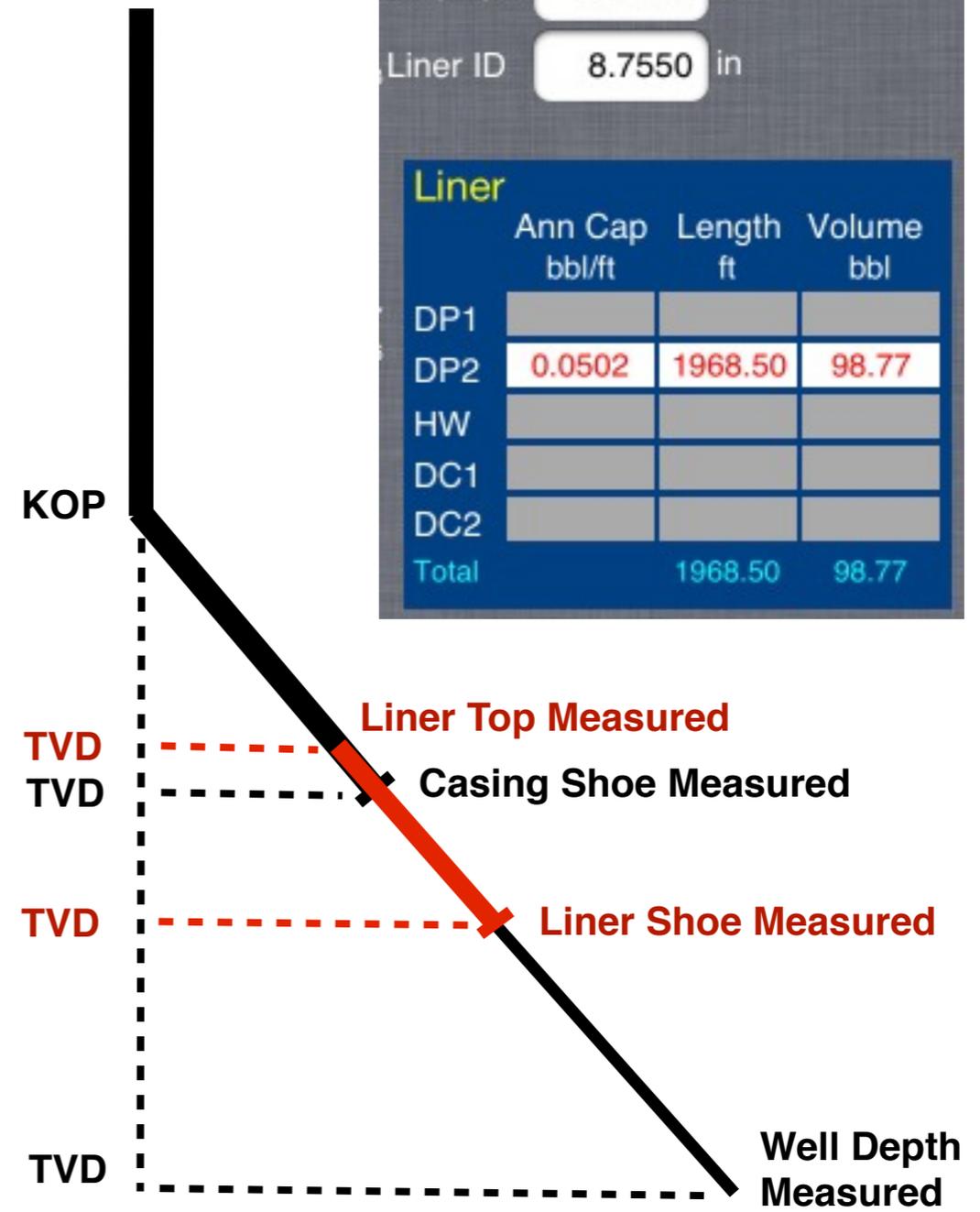
Top 5577.43 ft 5577.43

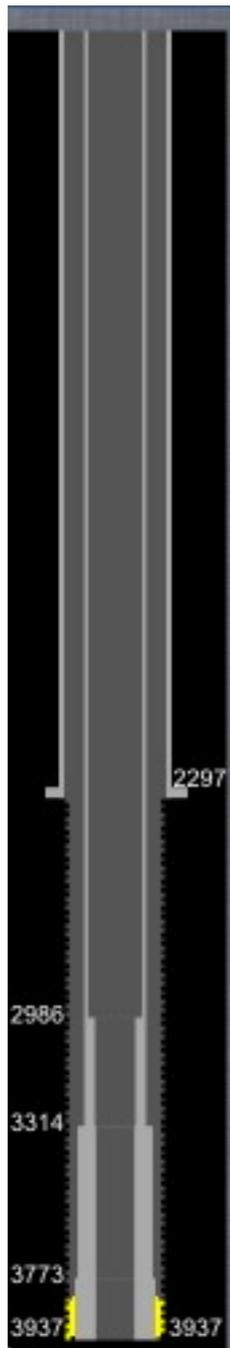
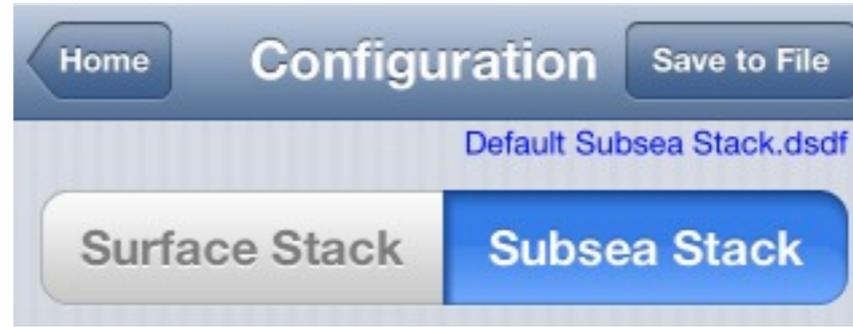
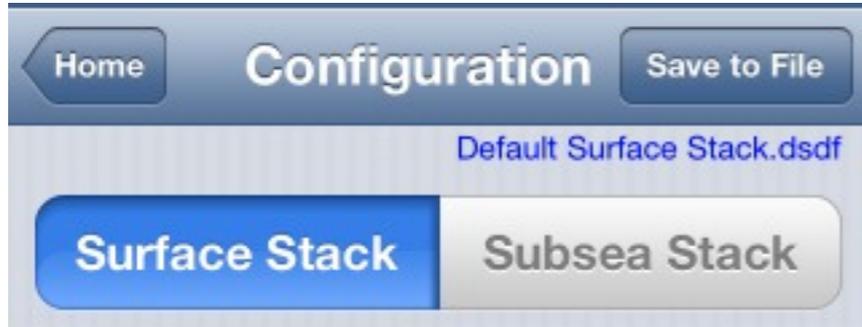
Shoe 7545.93 ft 7545.93

Liner OD 9.6750 in

Liner ID 8.7550 in

Liner	Ann Cap bbl/ft	Length ft	Volume bbl
DP1			
DP2	0.0502	1968.50	98.77
HW			
DC1			
DC2			
Total		1968.50	98.77

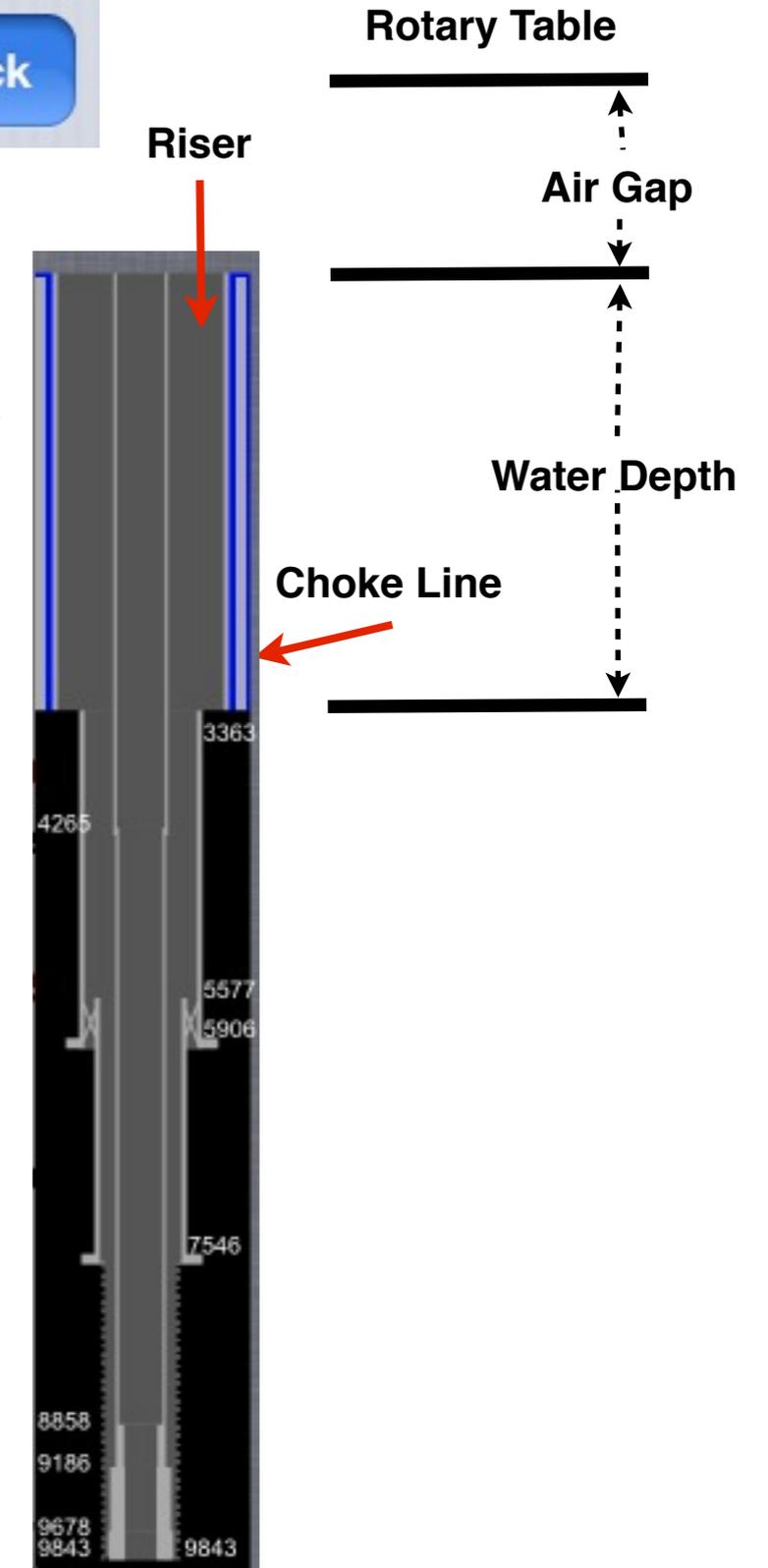




**Kill Line** →

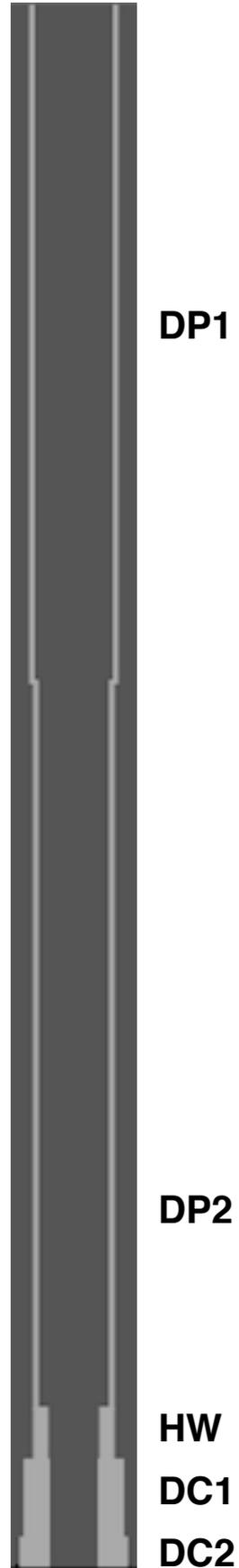
**BOP Depth = Water Depth + Air Gap** →

Water depth	3280.8	Air Gap	82.02
Riser ID	18.7500	C/K ID	3.0000
Casing ID	12.4150 in		
Hole size	8.5000 in		
Csg shoe	5905.51 ft		
Well MD	9842.52 ft		



The drill string can be configured with:

- 2 types of drill pipes (DP1 and DP2)
- 1 heavy weight drill pipe (HW)
- 2 drill collars (DC1 and DC2)



	Length	Weight	Email
		Weight lb/ft	O.D. in
DP1		21.90	5.5000
DP2		19.50	5.0000
HW		49.30	5.0000
DC1		83.90	6.2500
DC2		101.30	6.7500

**Note:**  
The Pipe Nominal Weight Parameter just can be edited with iPhone on vertical Position

	Length ft	O.D. in	I.D. in
DP1	4265.09	5.5000	4.7780
DP2	4593.18	5.0000	4.2760
HW	328.08	5.0000	3.0000
DC1	492.13	6.2500	2.8125
DC2	164.04	6.7500	2.8125

	Cap bbl/ft	Length ft	Volume bbl
DP1	0.0408		
DP2	0.0459	1312.34	60.24
HW	0.0459	328.08	15.06
DC1	0.0322	492.13	15.87
DC2	0.0259	164.04	4.25
<b>Total</b>		<b>2296.59</b>	<b>95.42</b>

**Drill String Weight**

Nominal	257.05	kips
w/ Buoyancy	219.38	kips
Hook Load	339.38	kips

iPhone 5 / iPod Touch 5 gen

Section Internal Volume

Vertical Directional Liner

Water depth: 3280.8 Air Gap: 82.02  
 Riser ID: 18.7500 C/K ID: 3.0000  
 Casing ID: 12.4150 in  
 Hole size: 8.5000 in  
 Csg shoe: 5905.51 ft  
 Well MD: 9842.52 ft

strokes	Cap Int bbl/ft	Length ft	Volume * bbl
CL/KL	0.0087	3362.86	29.40
Riser	0.3415	3362.86	1124.31
Casing	0.1497	2214.57	316.54
Liner	0.0745	1968.50	133.74
Hole	0.0702	2296.59	126.64
<b>Total</b>			<b>1760.03</b>

Buttons: w/o steel, w/ steel

Drill String Bit Grad Mud Forms

Wellbore x Drill String annular

Length Weight Email

	Length ft	O.D. in	I.D. in
DP1	4265.09	5.5000	4.7780
DP2	4593.18	5.0000	4.2760
HW	328.08	5.0000	3.0000
DC1	492.13	6.2500	2.8125
DC2	164.04	6.7500	2.8125

bit depth: 9842.52 well depth: 9842.52

Int	Steel	Riser	Cas	Liner	Hole
	Cap bbl/ft	Length ft	Volume bbl		
DP1	0.0408				
DP2	0.0459	1312.34	60.24		
HW	0.0459	328.08	15.06		
DC1	0.0322	492.13	15.87		
DC2	0.0259	164.04	4.25		
<b>Total</b>		<b>2296.59</b>	<b>95.42</b>		

Drill String Weight

Nominal: 257.05 kips  
 w/ Buoyancy: 219.38 kips  
 Hook Load: 339.38 kips

Internal Liner x Drill String annular

Back Liner Email

without Liner with Liner

MD TVD

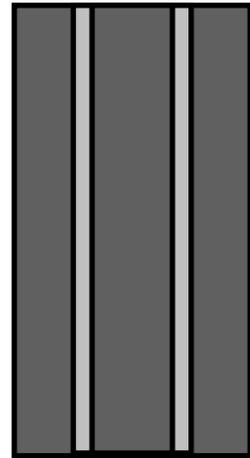
Top: 5577.43 ft 5577.43  
 Shoe: 7545.93 ft 7545.93  
 Liner OD: 9.6750 in  
 Liner ID: 8.7550 in

Liner	Ann Cap bbl/ft	Length ft	Volume bbl
DP1			
DP2	0.0502	1968.50	98.77
HW			
DC1			
DC2			
<b>Total</b>		<b>1968.50</b>	<b>98.77</b>

Internal Volume (just volume of fluid)  
Calculated without the steel volume (drill string)

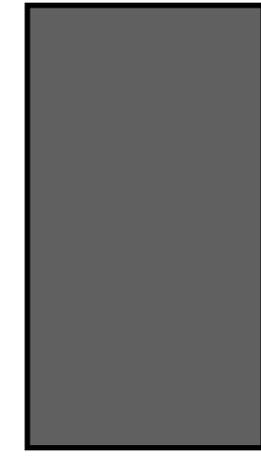
Total Internal Volume  
(volume of fluid + volume of steel)

Well bore  
←-- ID -->



strokes	Cap Int bbl/ft	Length ft	Volume * bbl
CL/KL	0.0087	3362.86	29.40
Riser	0.3415	3362.86	1124.31
Casing	0.1497	2214.57	316.54
Liner	0.0745	1968.50	133.74
Hole	0.0702	2296.59	126.64
Total	w/o steel	w/ steel	1760.03

Well bore  
←-- ID -->



strokes	Cap Int bbl/ft	Length ft	Volume * bbl
CL/KL	0.0087	3362.86	29.40
Riser	0.3415	3362.86	1148.55
Casing	0.1497	2214.57	331.60
Liner	0.0745	1968.50	146.58
Hole	0.0702	2296.59	161.20
Total	w/o steel	w/ steel	1846.74

↑  
Drill String  
ID

Strokes with Mud Pump #1

Strokes with Mud Pump #2

strokes



cap/vol	Strokes w/	MP 1	MP 2
Surface to Bit		1557	
Bit to Shoe		798	
Riser Annular		8784	
Bit to BOP		3911	
Choke Line		246	
Bit to Choke		4157	

cap/vol	Strokes w/	MP 1	MP 2
Surface to Bit		1573	
Bit to Shoe		807	
Riser Annular		8875	
Bit to BOP		3952	
Choke Line		249	
Bit to Choke		4201	

Tap on “Nozzles” option to edit the coefficient and to set until 4 types of nozzles x until 10 units per type to calculate the TFA

Select “Fixed” option to edit the TFA = Total Flow Area



$$\text{Bit Loss} = \frac{\text{MW} \times \text{Flow}^2}{12032 \times \text{Coeff}^2 \times \text{TFA}^2}$$

Back Grad. Email Temperature

$\rho_{\text{absorption}}$  12.0 ppg 0.6234 psi/ft

$\rho_{\text{fracture}}$  12.0 ppg 0.6234 psi/ft

Porosity 35.0 %

Permeability 300 md

Shoe Depth Hydrost. 1145.3 psi

Absorption Pressure 1431.6 psi

Fracture Pressure 1431.6 psi

Grad. Temp Gradient Email

Temp grad 1.400 F/100ft

Surf Temp 28.0 °C 82.4 °F 301.1 K

Sea Temp 4.0 °C 39.2 °F 277.1 K

Bottom Hole Temperature 54.4 °C

129.9 °F

327.5 K

589.6 R

For use with this “Drilling Simulator” app, normally:

**Absorption Gradient = Fracture Gradient**

This parameter is used just for compatibility with the apps "Well Control Simulator" and "LOT Simulator".

This app works just with the parameters used in the hydraulics calculations:

→ **Mud Weight, Plastic Viscosity, Yield Point and Initial Gel**

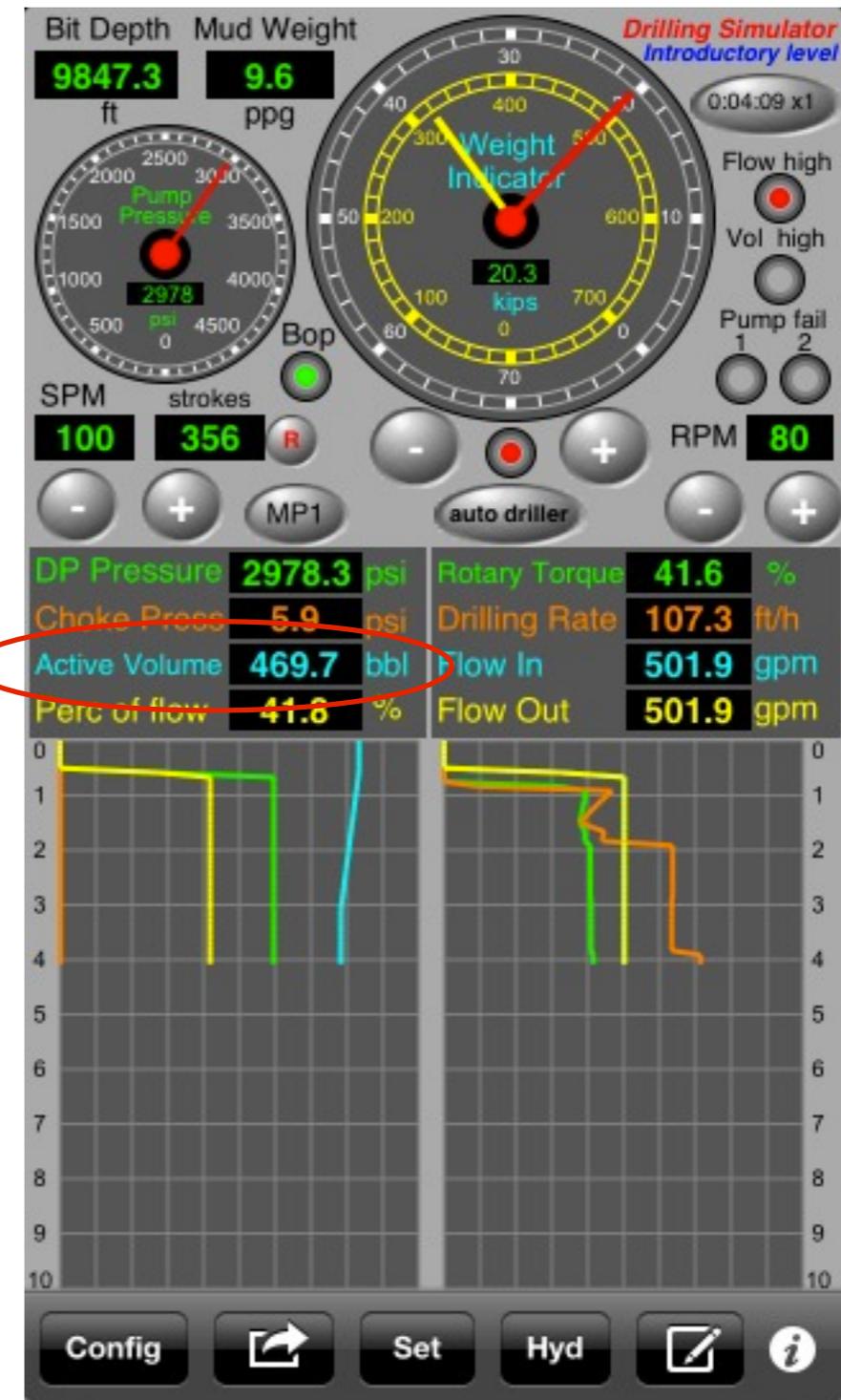
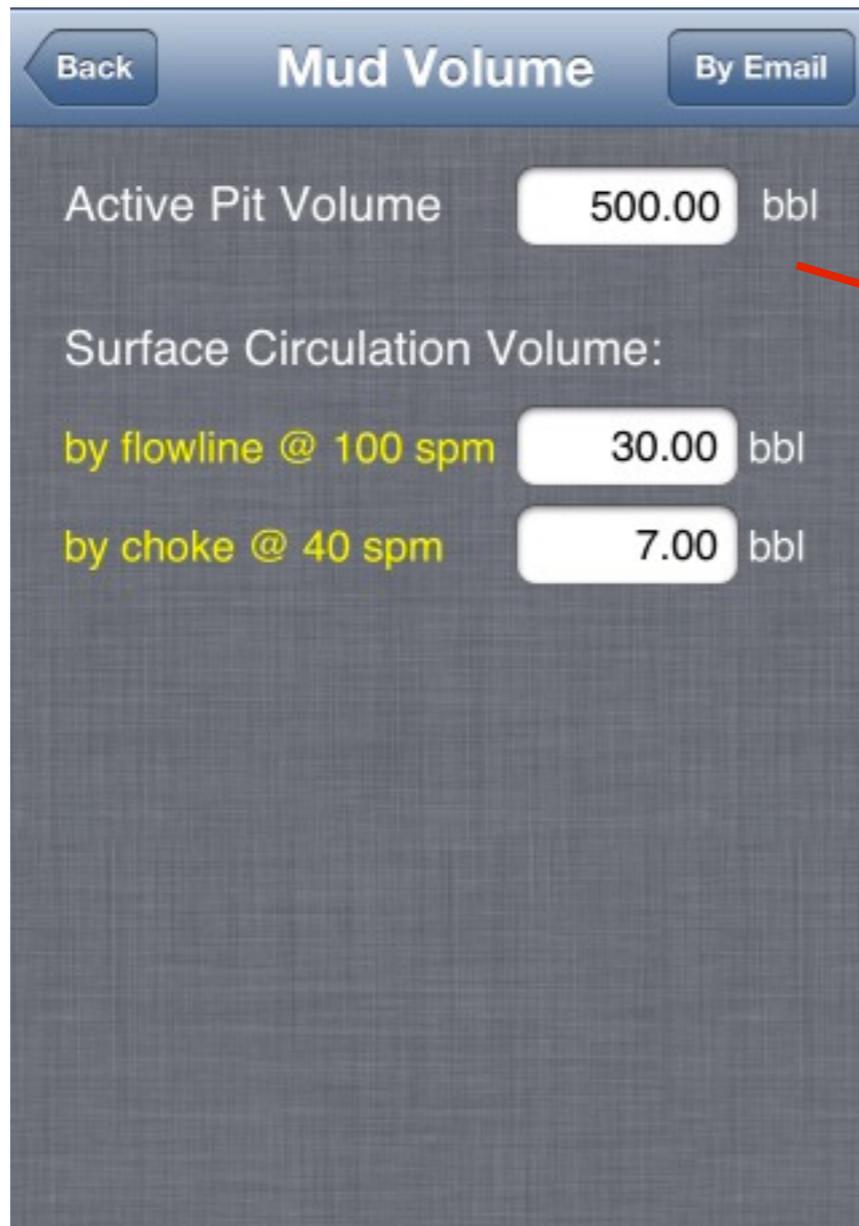
The screenshot displays the app's interface for drilling fluid parameters. At the top, there are navigation buttons: 'Back', 'Email', 'Volumes', and 'Calcs'. The main area is divided into two sections. The upper section, with a brown background, contains input fields for 'Mud Weight' (9.60 ppg), 'Mud weight Gradient' (0.4987 psi/ft), 'Plastic Viscosity' (15.0 cP), 'Yield Point' (10.0 lb/100ft<sup>2</sup>), and 'Initial Gel' (5.0 lb/100ft<sup>2</sup>). Below these is a 'Rheological Model' section with 'Power' and 'Bingham' buttons. The lower section, with a blue background, displays calculated results: 'Buoyancy Factor' (0.8534), 'Shoe Depth Hydrost.' (1145.3 psi), 'Fracture Pressure' (1431.6 psi), and 'Bottom Hole Hydrost.' (1963.4 psi).

Parameter	Value	Unit
Mud Weight	9.60	ppg
Mud weight Gradient	0.4987	psi/ft
Plastic Viscosity	15.0	cP
Yield Point	10.0	lb/100ft <sup>2</sup>
Initial Gel	5.0	lb/100ft <sup>2</sup>
Buoyancy Factor	0.8534	
Shoe Depth Hydrost.	1145.3	psi
Fracture Pressure	1431.6	psi
Bottom Hole Hydrost.	1963.4	psi

Edit the Active Pit Volume. This parameter is shown on graph on Main View.

The Choke parameters are used just for compatibility with the app "Well Control Simulator".

**Note: This simulator does not allow circulation through the choke.**

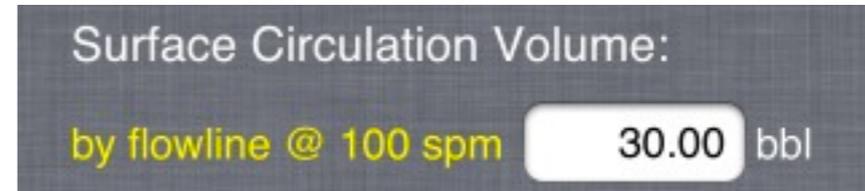


## About the Surface Circulation Volume (SCV):

Surface Circulation Volume = Volume of the flow line, pipes, etc when circulating at the surface.

When occur a kick on the drilling, the driller stops the mud pump and the "Surface Circulation Volume" return to tank.

The calculation of the real volume of the kick = Static Vol. after shut-in the well - Dynamic Volume on drilling - Surface Circulation Volume.



Example: Static Volume (mud pump stopped) = 100 bbl  
Drilling with mud pump @ 100 spm => Dynamic Volume = 70 bbl

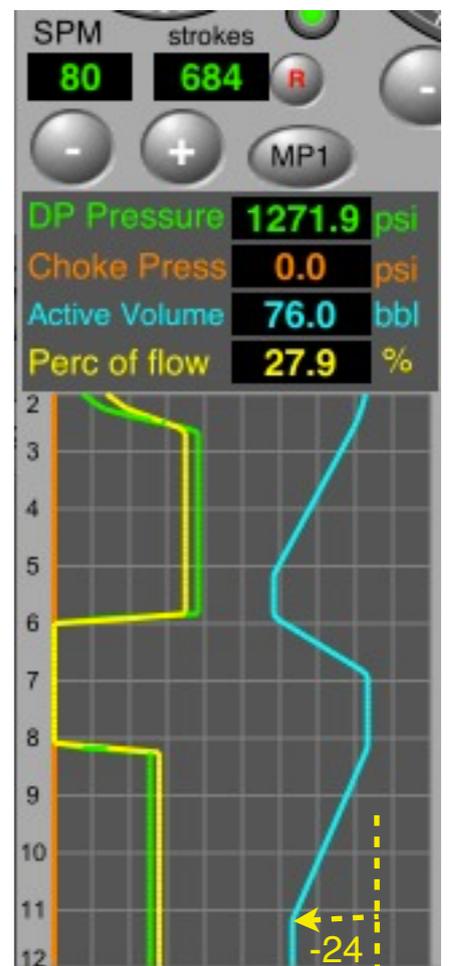
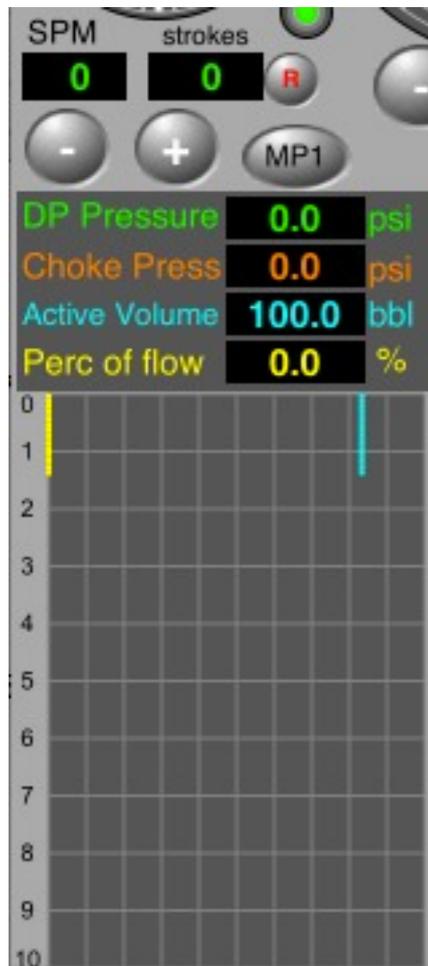
- Surface Circulation Volume @ 100 spm = 30 bbl
- Shut-in the well => pit volume = 110 bbl
- Kick Volume = 110 - 70 - 30 = 10 bbl

SPM = 0 (mud pump stopped)  
Active Volume = 100 bbl  
SCV = 0 bbl

SPM = 100  
Dynamic Volume = 70 bbl  
SCV = 30 bbl

SPM = 0  
Static Volume = 100 bbl  
SCV = 0 bbl

SPM = 80  
Dynamic Volume = 76 bbl  
SCV = 24 bbl



### Set 4 parameters for each formation:

- Height
- Pore Equivalent Weight
- Soft <--> Hard to drill
- Fluid Density in the formation

Note:

Fluid Density minimum = 8.50 ppg to the formations 1, 2 and 3

Only to the formation #4:

Fluid Density  $\geq$  1.0 ppg

Back Formation 1 By Email

Height 1.64 ft

Soft 30.0 %

Pore Equiv. Weight 9.20 ppg

Fluid Density 8.50 ppg

Formation 2 Formation 3 Formation 4

Formation 1 Formation 4 By Email

Height 5.91 ft

Soft 60.0 %

Pore Equiv. Weight 10.75 ppg

Fluid Density 2.00 ppg

Use mud pumps 1 and 2 to align to drill string

Configura... Mud Pump 1 **Pumps 2/3**

Liner diameter 6.5000 in

Max Pressure 4200 psi

Piston Length 12.00 in

Piston diameter 2.0000 in

Power 1300 hp

Efficiency 97.0 %

Type  Triplex  Duplex

Discharge volume 0.1195 bbl/stk  
(true pump output) 5.0192 gal/stk

Maximum Speed 120 spm

### Mud Pump #3:

The same parameters of the mud pump #2.  
It is used to **Booster Line** of the riser (Subsea only).

Mud Pump 1 Mud Pumps 2 / 3\*

Liner diameter 6.5000 in

Max Pressure 4200 psi

Piston Length 12.00 in

Piston diameter 2.0000 in

Power 1300 hp

Efficiency 96.0 %

Type  Triplex  Duplex

Discharge Vol. 0.1183 bbl/stk  
4.9675 gal/stk

Maximum Speed 120 spm

\* Mud Pump #3 used to Booster Line of the riser (Subsea only).

Mud Pump to  
Booster Line

Edit the length and ID parameters for Standpipe, Mud Hose, Swivel/TD and Kelly/Stand

Connections	Length ft	I.D in
Standpipe	49.21	4.0000
Mud Hose	59.06	3.0000
Swivel / TD	6.6	3.0000
Kelly / Stands	42.7	4.0000
Volume *	2.00	bbl

\* Volume included on drill string strokes calculations.

Note:  
This volume is included  
on drill string strokes calculations

Edit the parameter “Elevation System Weight”. The “Drill string Nominal Weight” is calculated with the drill string parameters.

**Hook Load** = “Drill string nominal weight **with buoyancy**” + “Elevation System Weight”

Configuration Elevation Email

Drilling Elevation System Weight

50 kips

Drill String Nominal Weight 129.55 kips

w/ Buoyancy 110.56 kips

Hook Load 160.56 kips



**Buoyancy Factor**

$$= 1 - \text{Mud Weight (ppg)} / 65.5$$

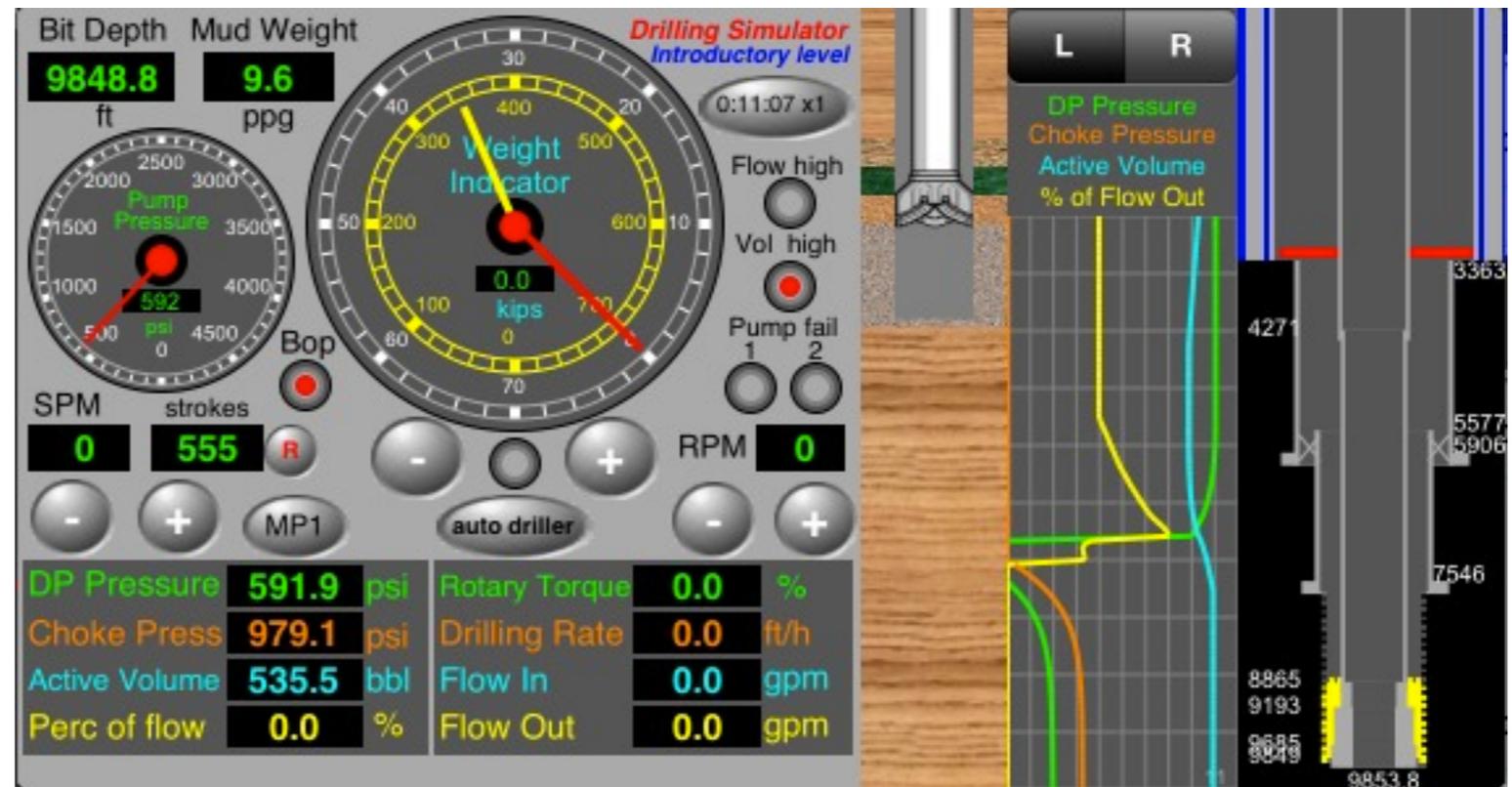
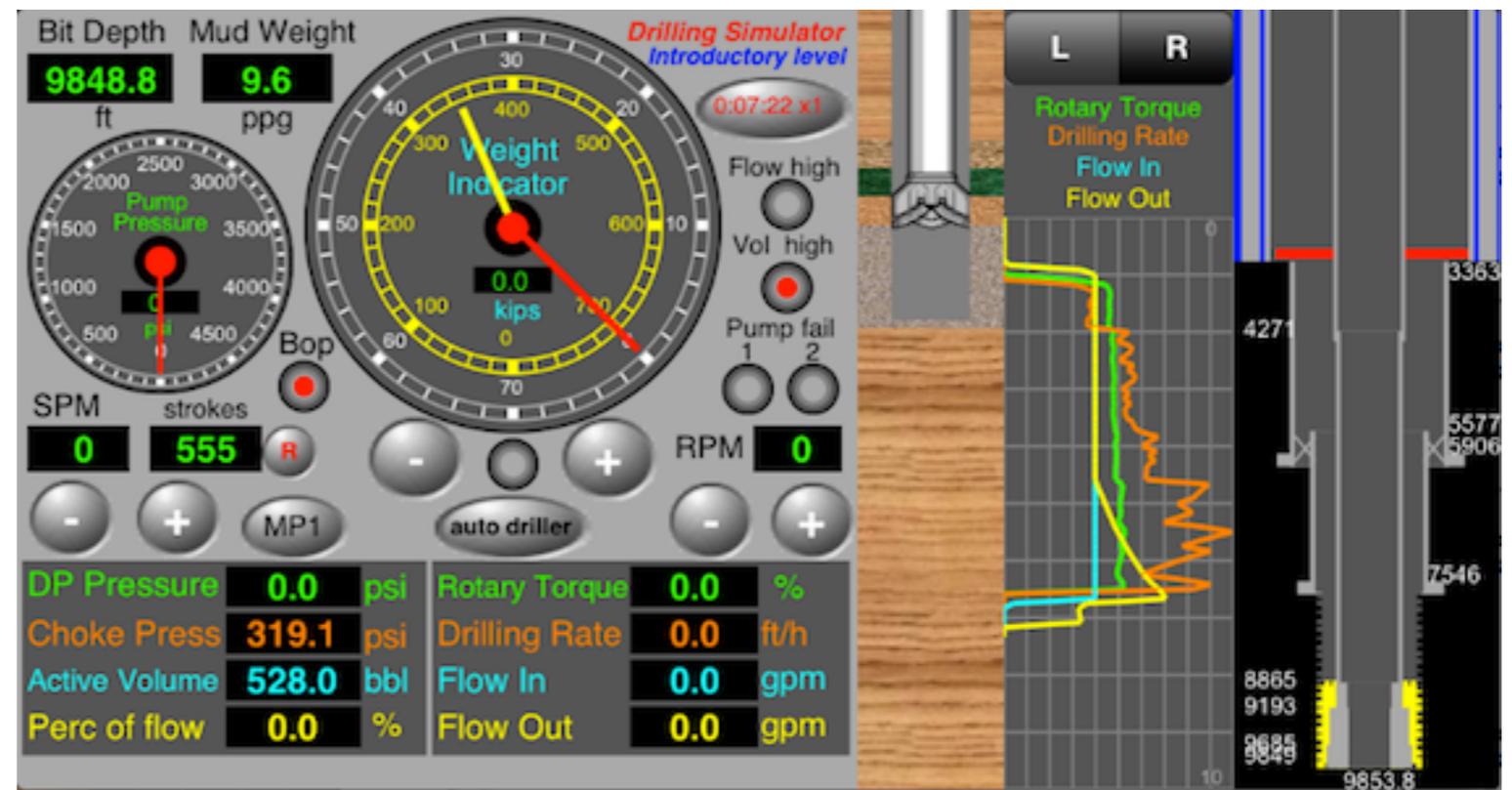
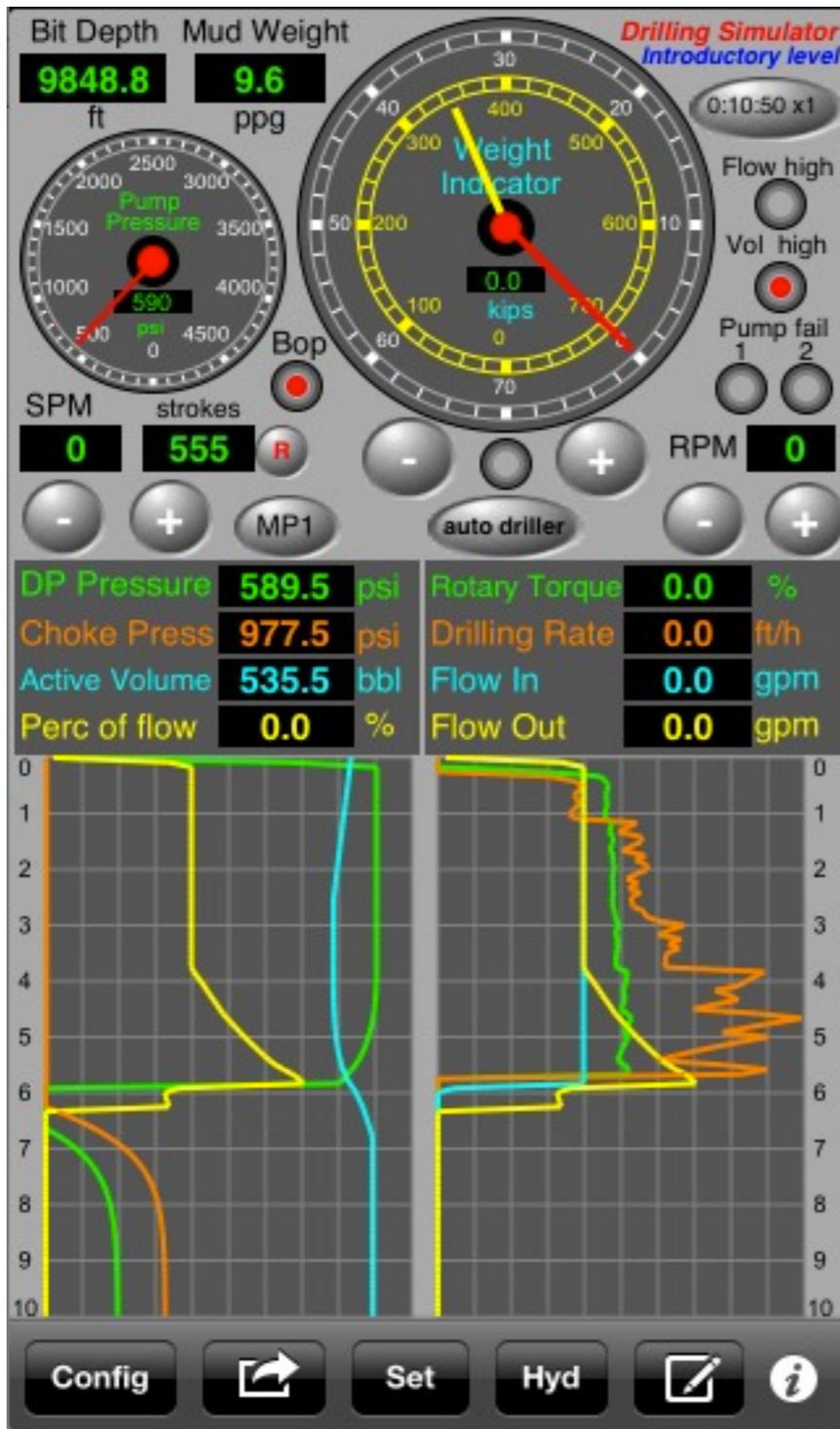
The Choke parameters are used just for compatibility with the app "Well Control Simulator".

**Note: This simulator does not allow circulation through the choke.**

Notes for this simulator:

1. if the pressure in the BOP is greater than the maximum BOP pressure, the BOP fails with subsequent blowout.
2. If the BOP is closed and set  $RPM > 0$ , BOP fails. Use this for blowout simulation.





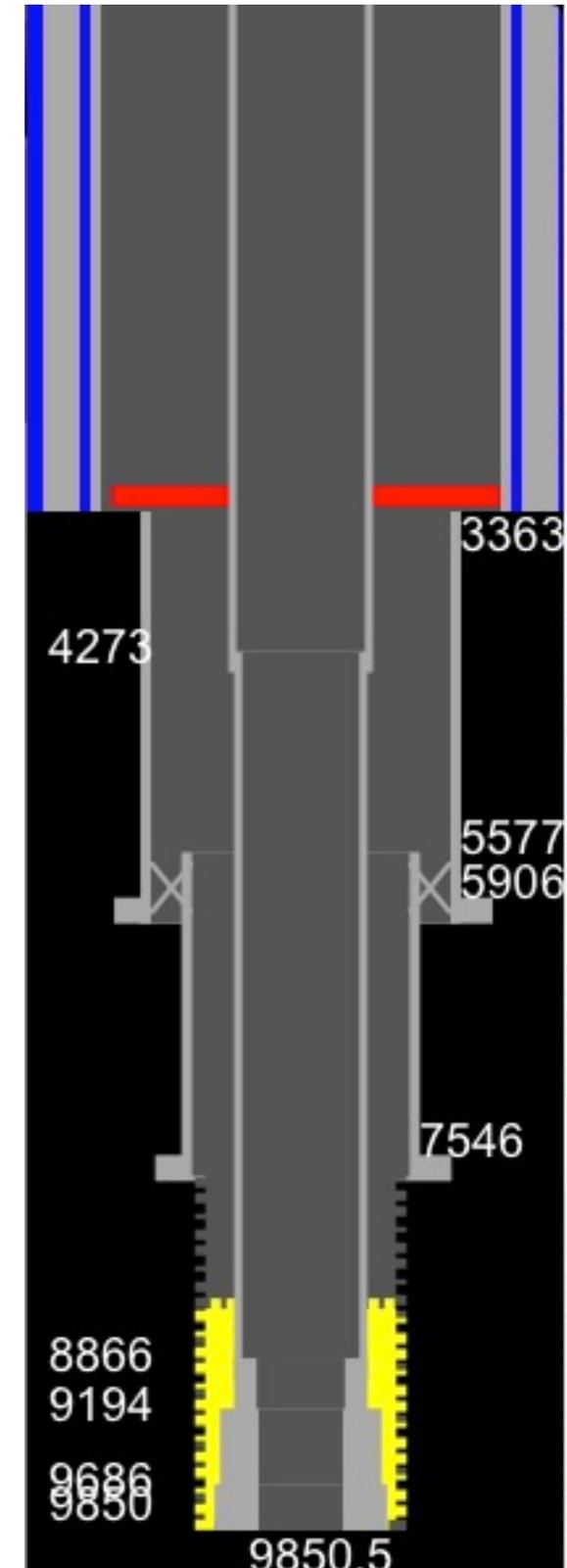
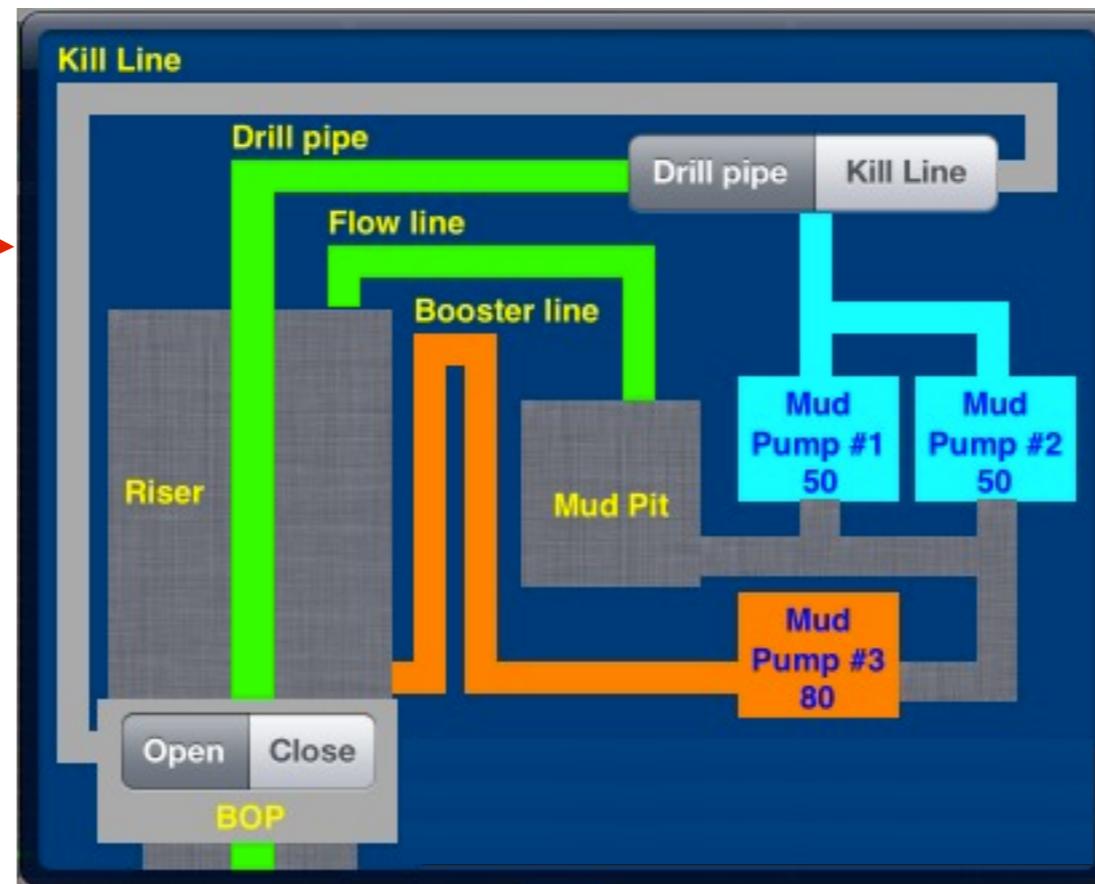
Tap on “**Options**” button on toolbar to select a circulation option:

- 1) Drill pipe -> Flow line (“Riser” on subsea): **circulation option for drilling**
- 2) Kill Line -> Flow Line (“Riser” on subsea): circulation option for pressure losses in kill / choke lines
- 3) Close BOP: No Circulation: option to shut-in the well after to detect kick and to wait stabilization of the pressures (SIDPP and SICP)

**Note: This simulator does not allow circulation through the choke.**

It is possible to use two mud pumps in parallel (MP #1 and MP #2)

The MP #3 is used to **Booster Line** of the riser (Subsea only) during the drilling to increase the flow in the riser.



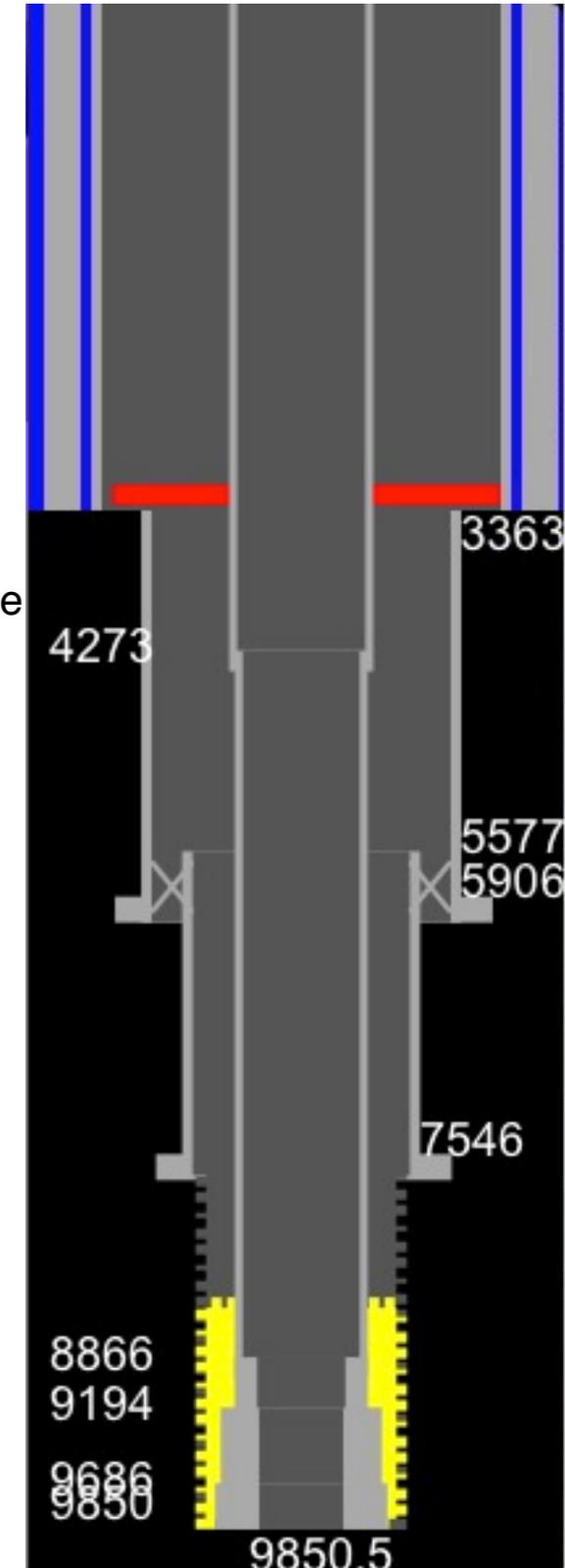
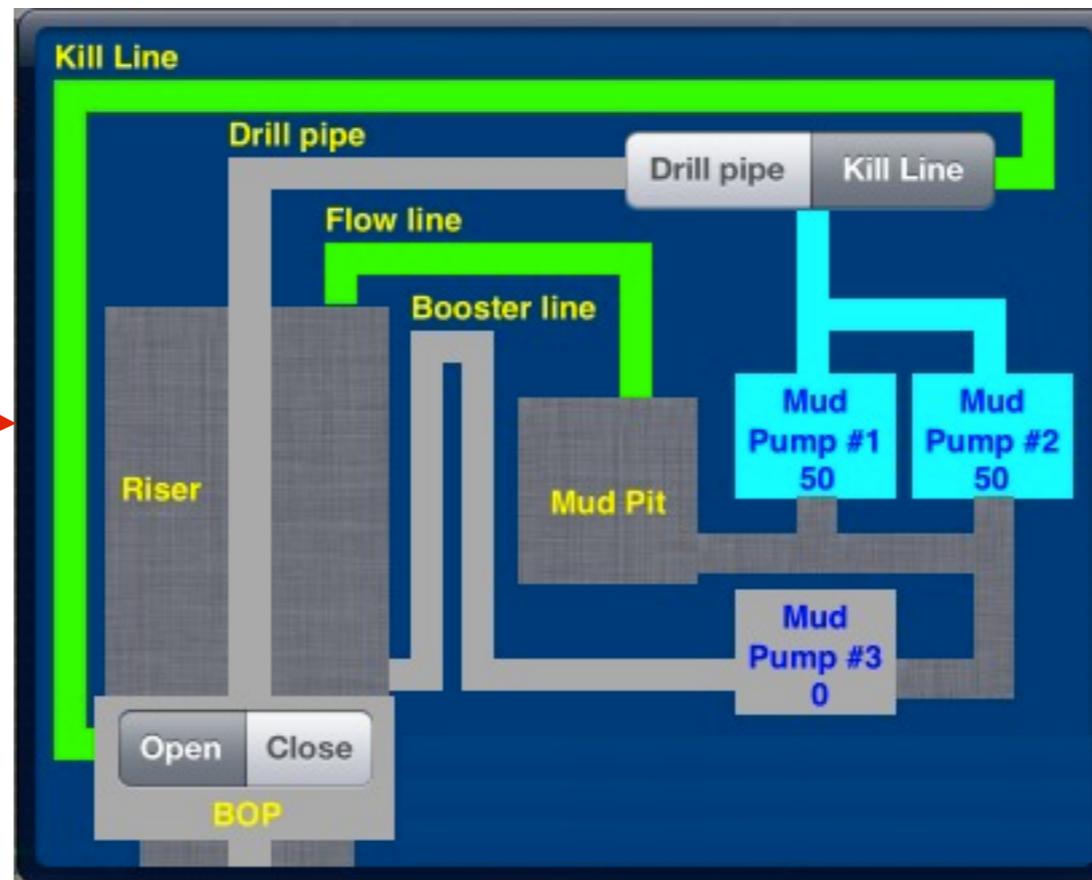
Tap on “Options” button on toolbar to select a circulation option:

- 1) Drill pipe -> Flow line (“Riser” on subsea): circulation option for drilling
- 2) Kill Line -> Flow Line (“Riser” on subsea): circulation option for pressure losses in kill / choke lines
- 3) Close BOP: No Circulation: option to shut-in the well after to detect kick and to wait the stabilization of the pressures (SIDPP and SICP)

**Note: This simulator does not allow circulation through the choke.**

To register the pressure losses in kill / choke lines (subsea only), normally is circulated through the kill line returning by riser (flow line) with the mud pump in the kill rate speed.

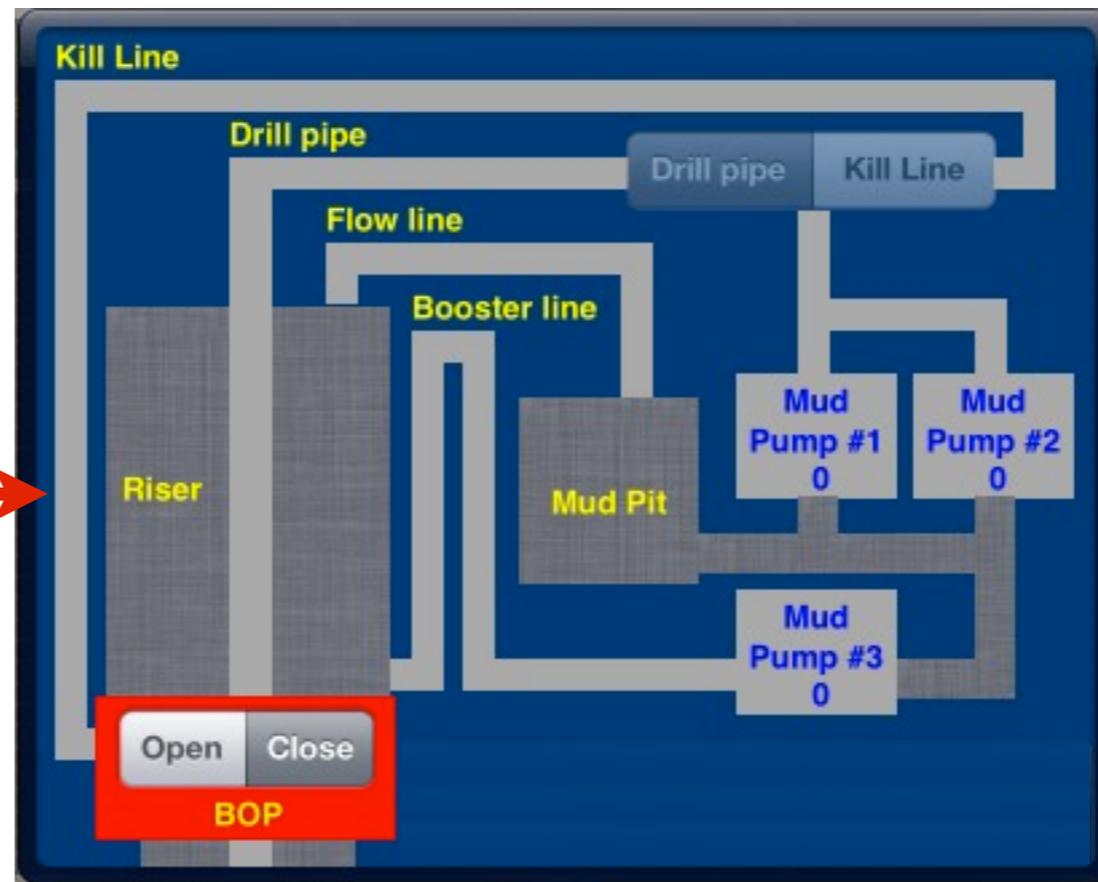
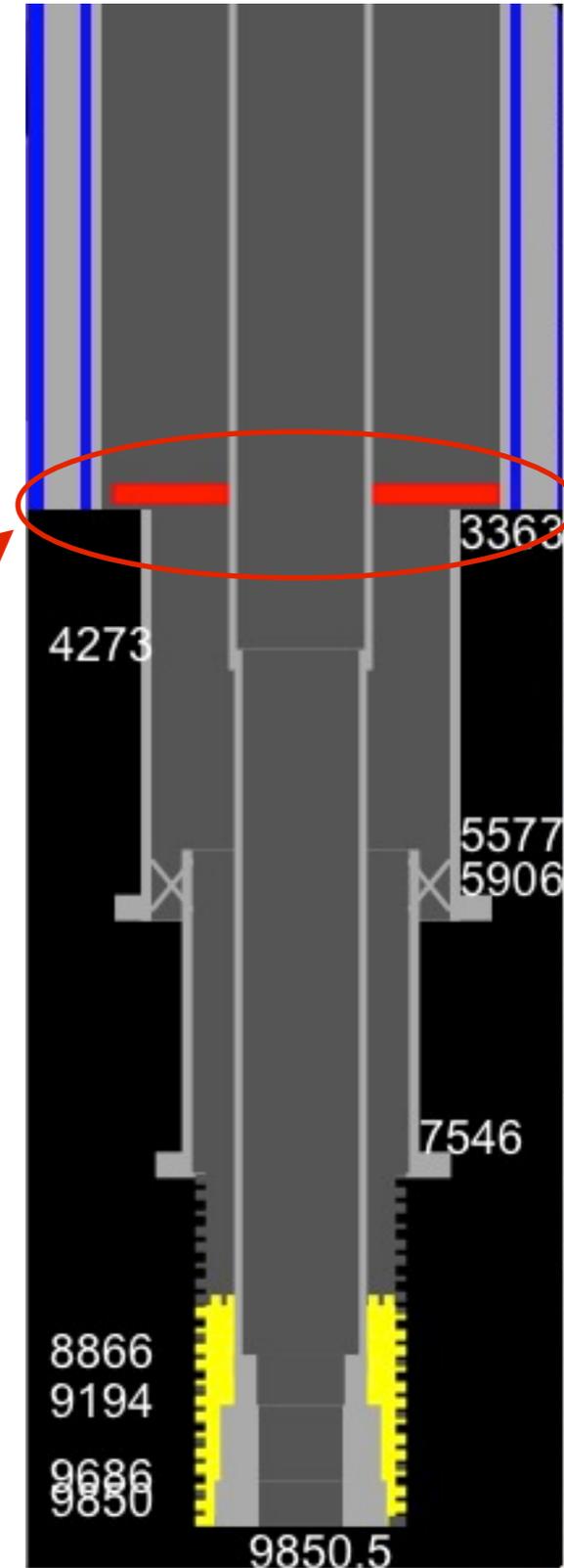
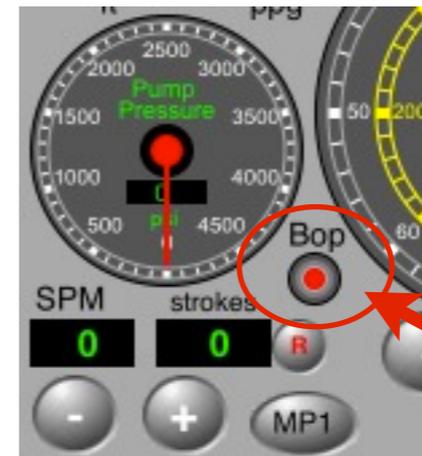
Kill Pump Pressure => Pressure Loss in Choke line (normally this lines have the same ID) and the pressure losses in the riser are close to zero.

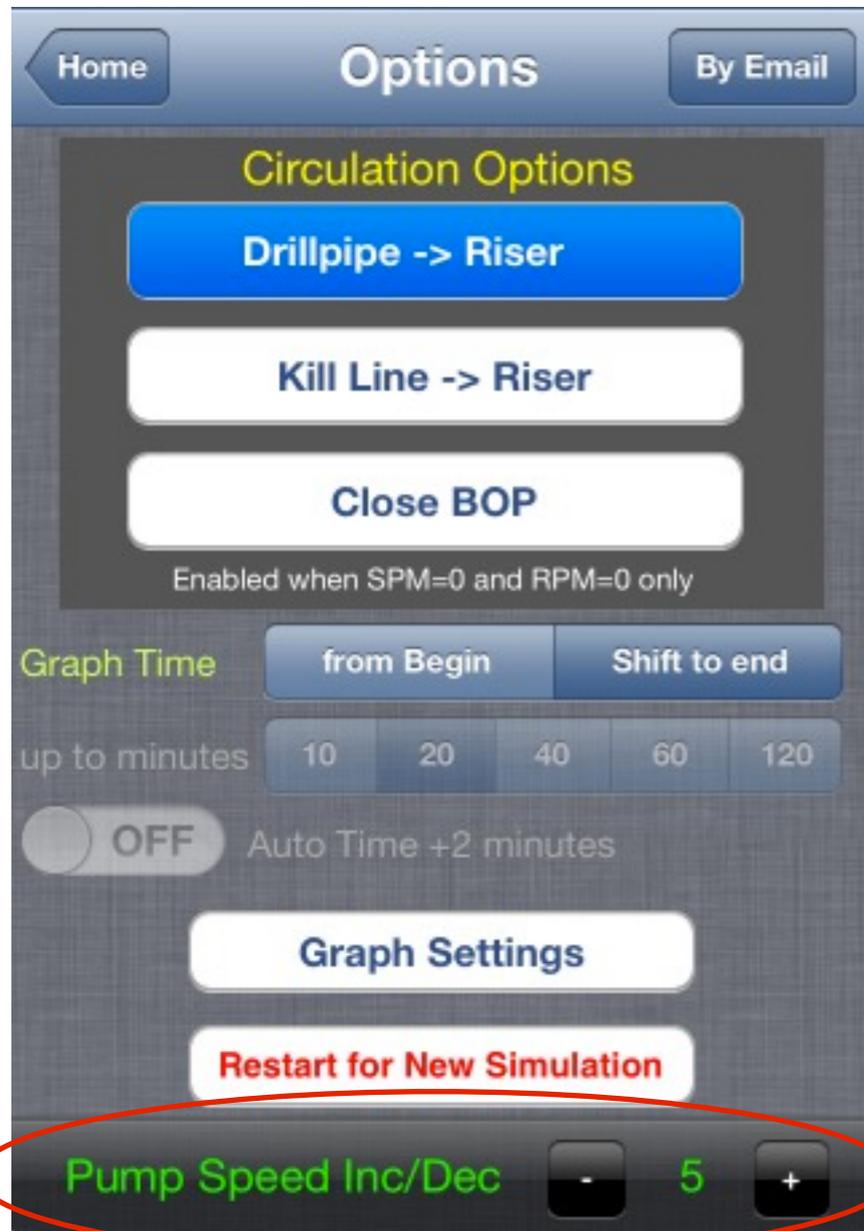


Tap on “Options” button on toolbar to select a circulation option:

- 1) Drill pipe -> Flow line (“Riser” on subsea): circulation option for drilling
- 2) Kill Line -> Flow Line (“Riser” on subsea): circulation option for pressure losses in kill / choke lines
- 3) Close BOP: No Circulation: **option to shut-in the well after to detect kick and to wait the stabilization of the pressures (SIDPP and SICP)**

Note: This simulator does not allow circulation through the choke.





SPM and Strokes with "Reset" button

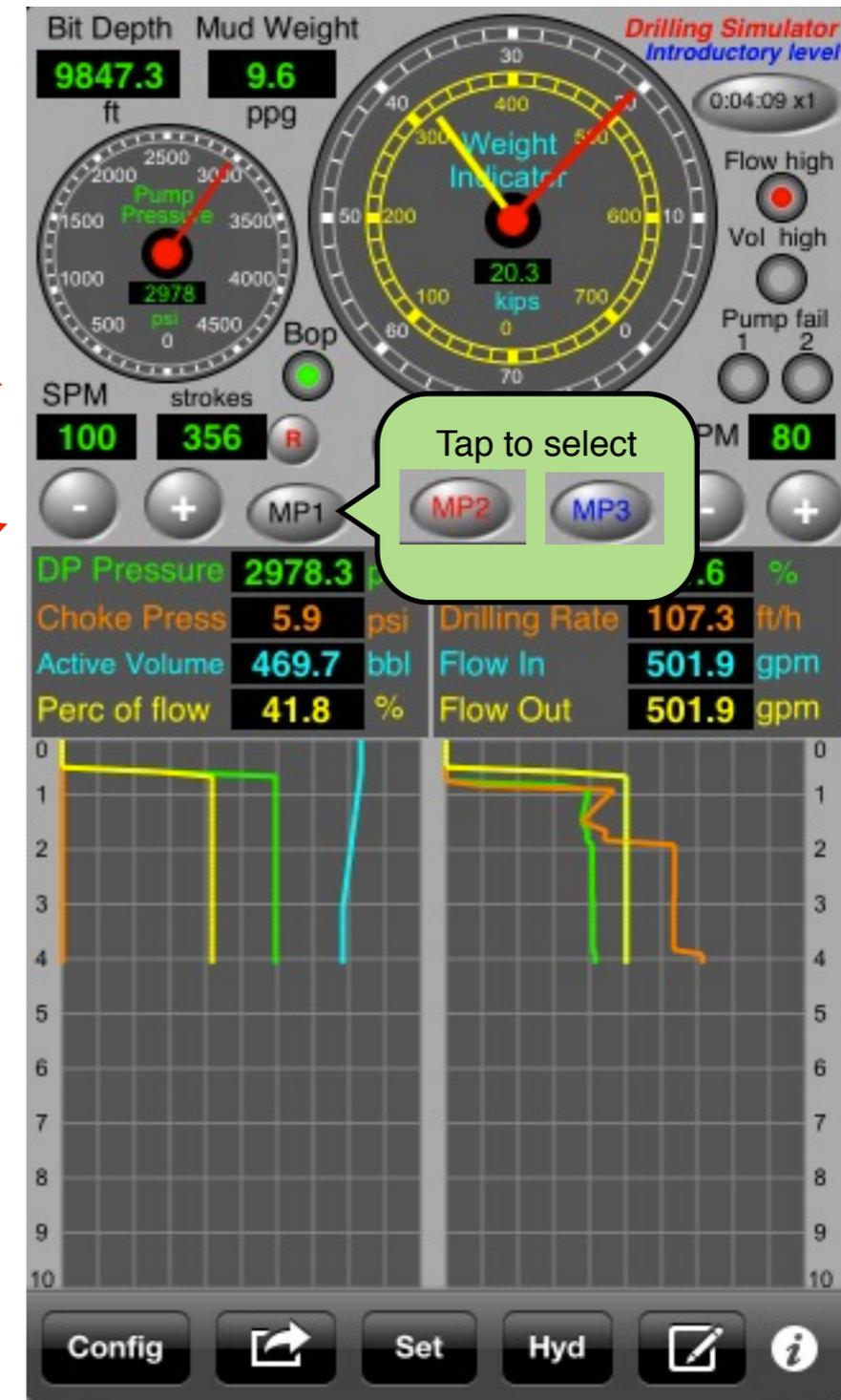


Tap on buttons to set the pump speed for each mud pump:

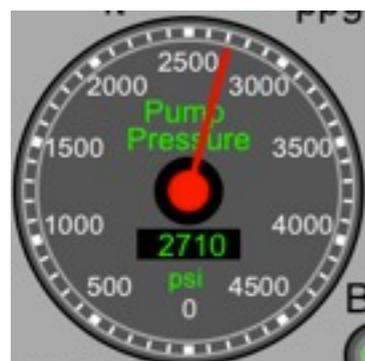
Set the decrement / increment of the pump speed for adjust on buttons.



Range: 1 to 5 spm  
Default: 5 spm

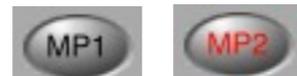


Flow Rate In / Out



**Manometer:**

Always shows the pump pressure of the mud pumps #1 and #2 in parallel.

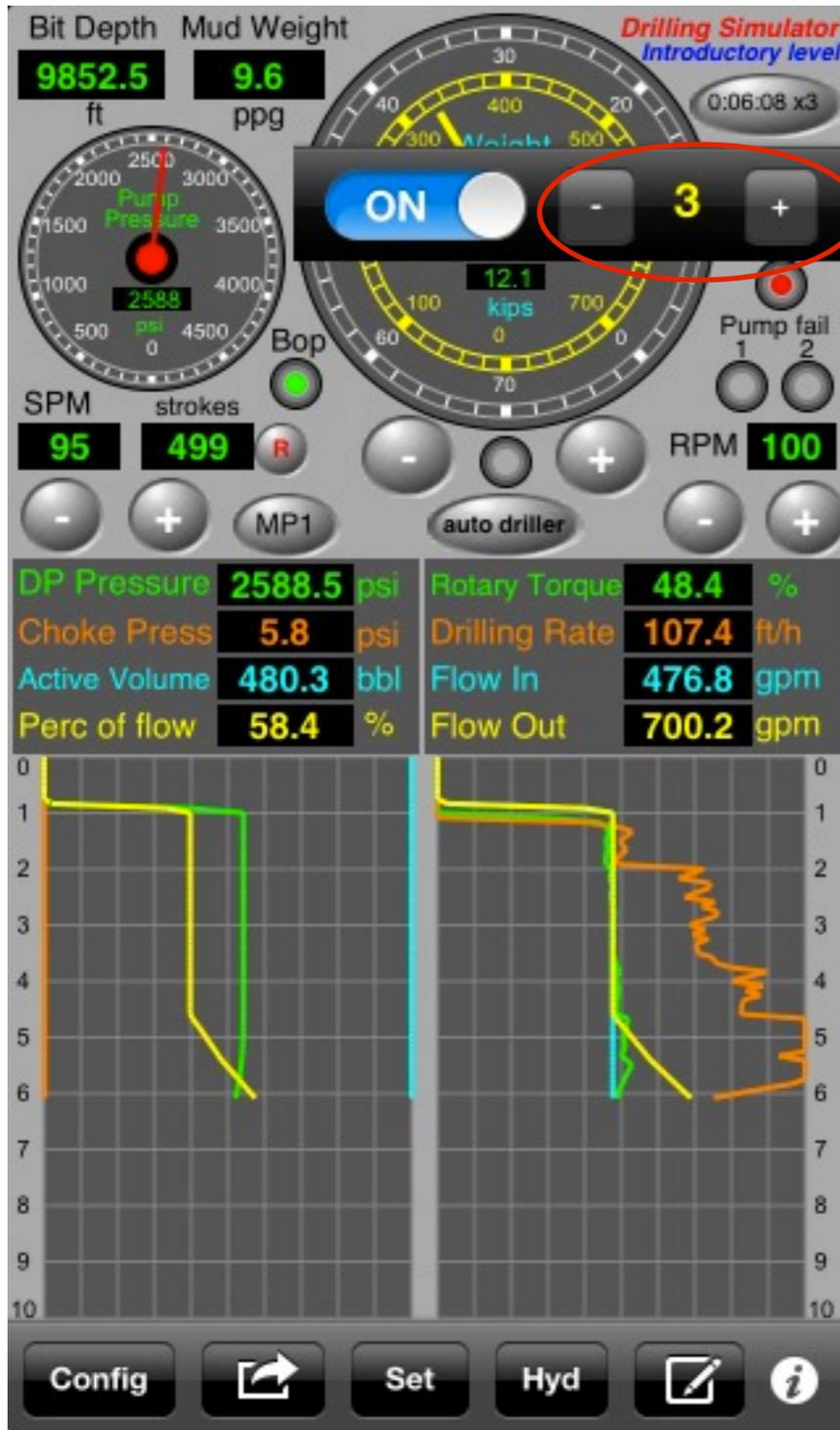


**Booster Line (Mud Pump #3):**



The pump pressure and pressure losses in booster line are not shown in this application.

Tap on "Timer" button to Pause and Set X times



Normal operation:  
**Black color**

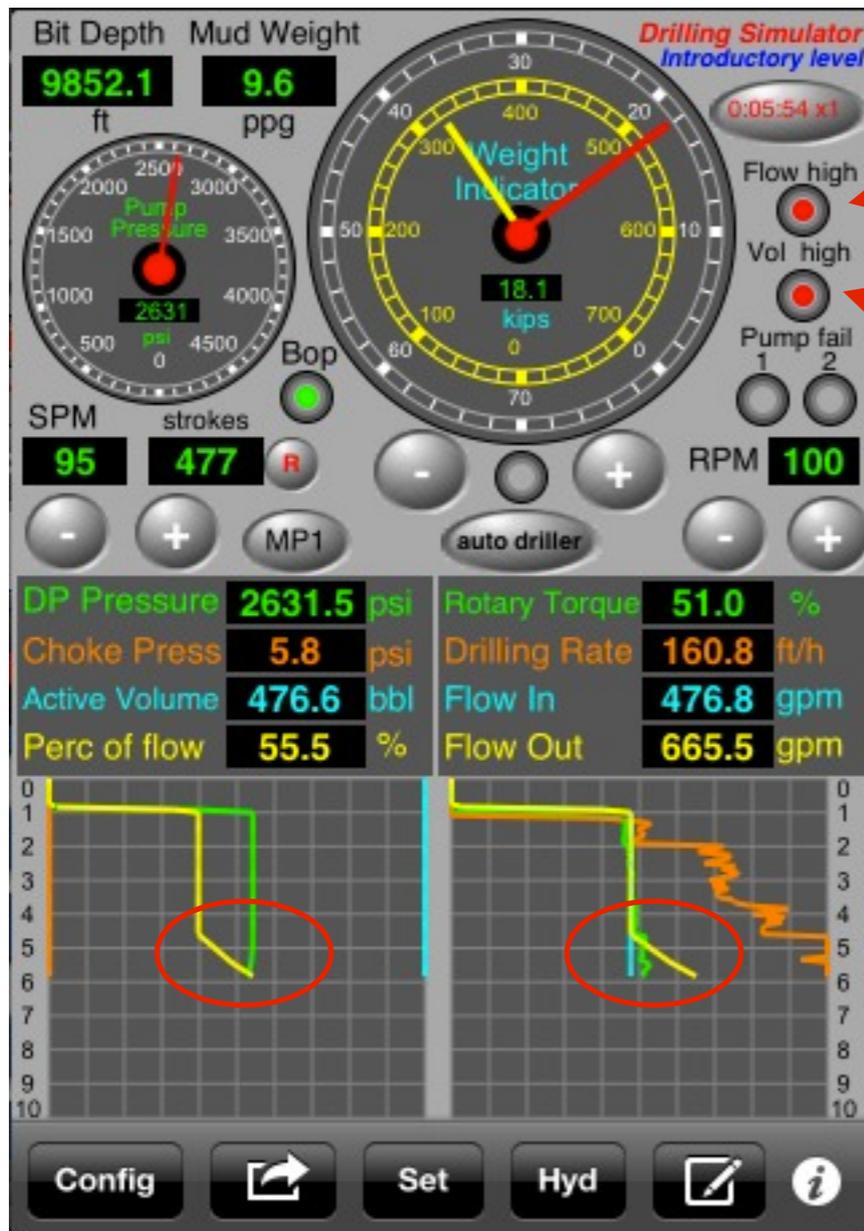
x times

Range: 1 to 9



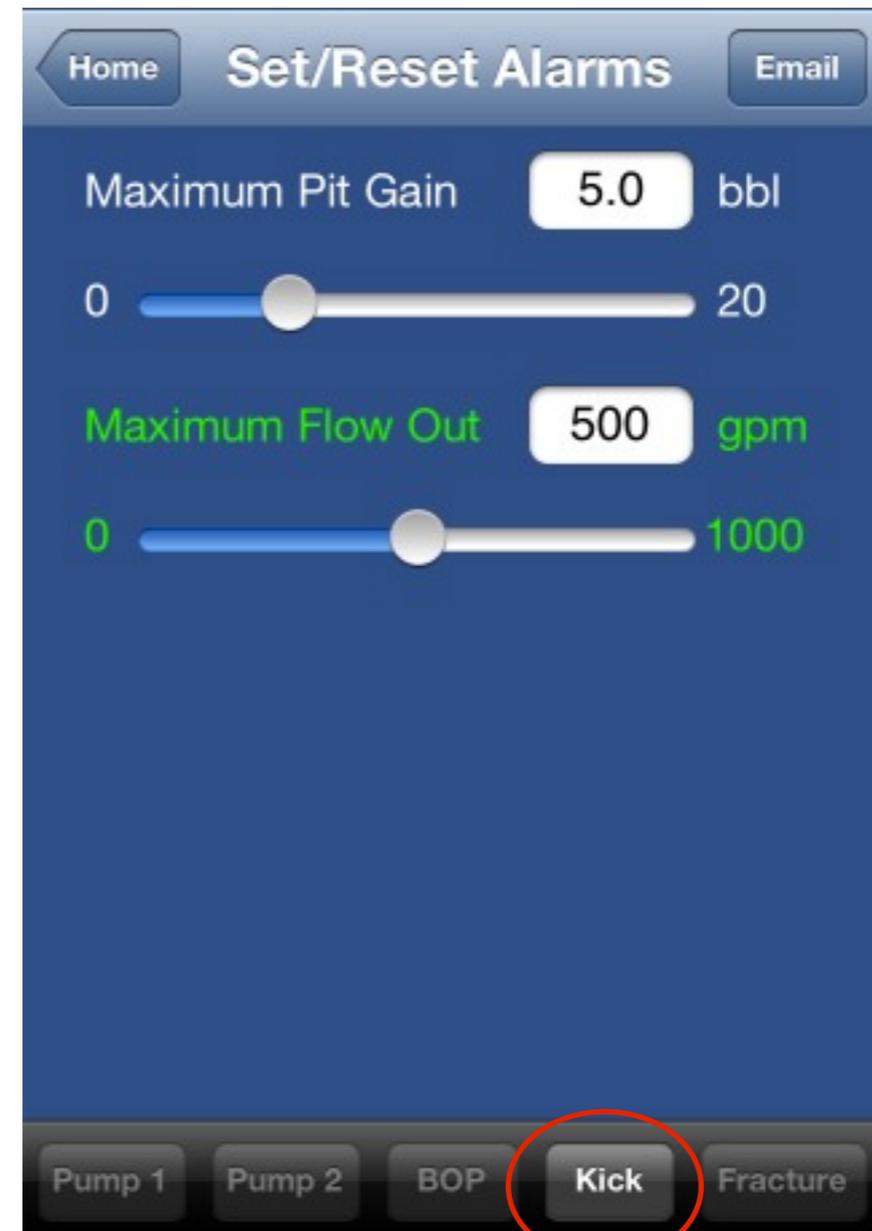
PAUSE:  
**Red color**

Tap on “**Set**” button to set alarms for kick detection and to reset failure alarms like failure on mud pumps, bop or reset a kick



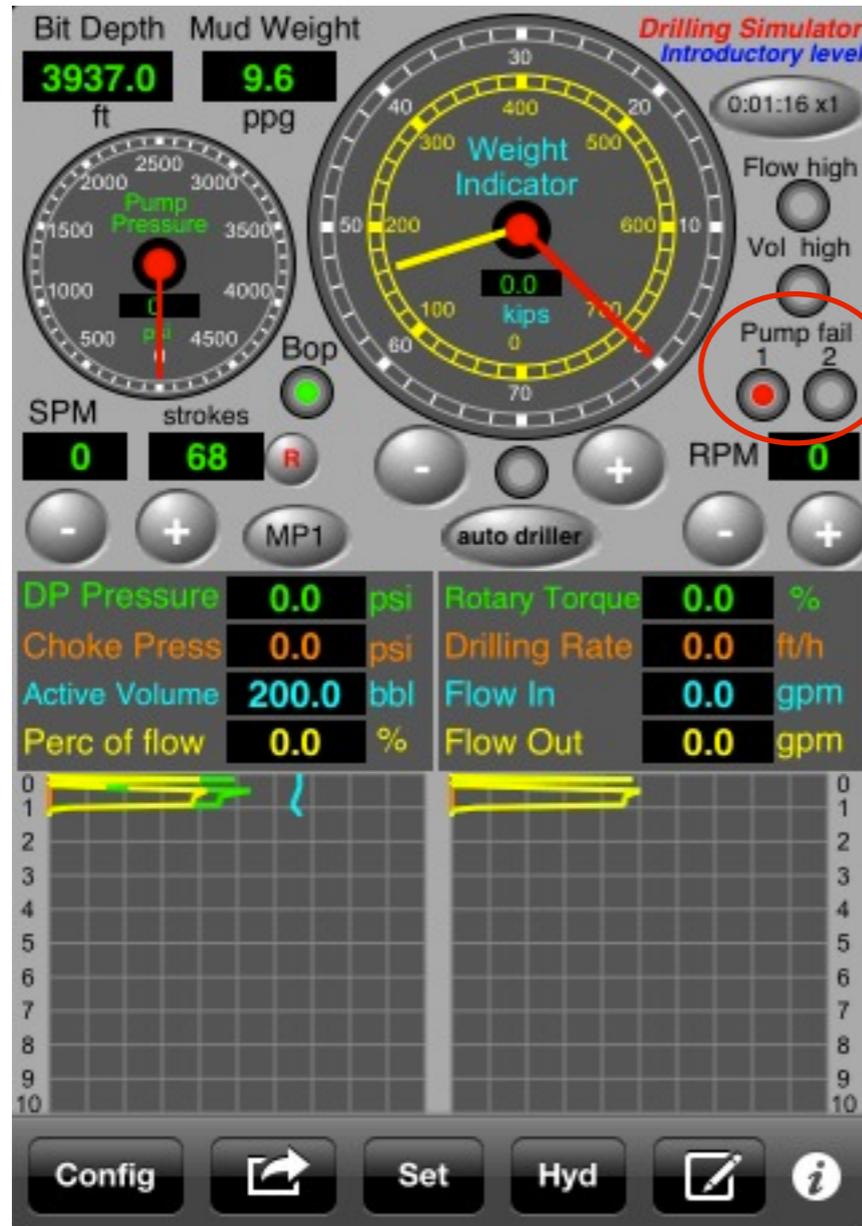
Increment of flow on the flow line > 500 gpm

Increment of volume on the mud pit > 5 bbl



Reset Kick

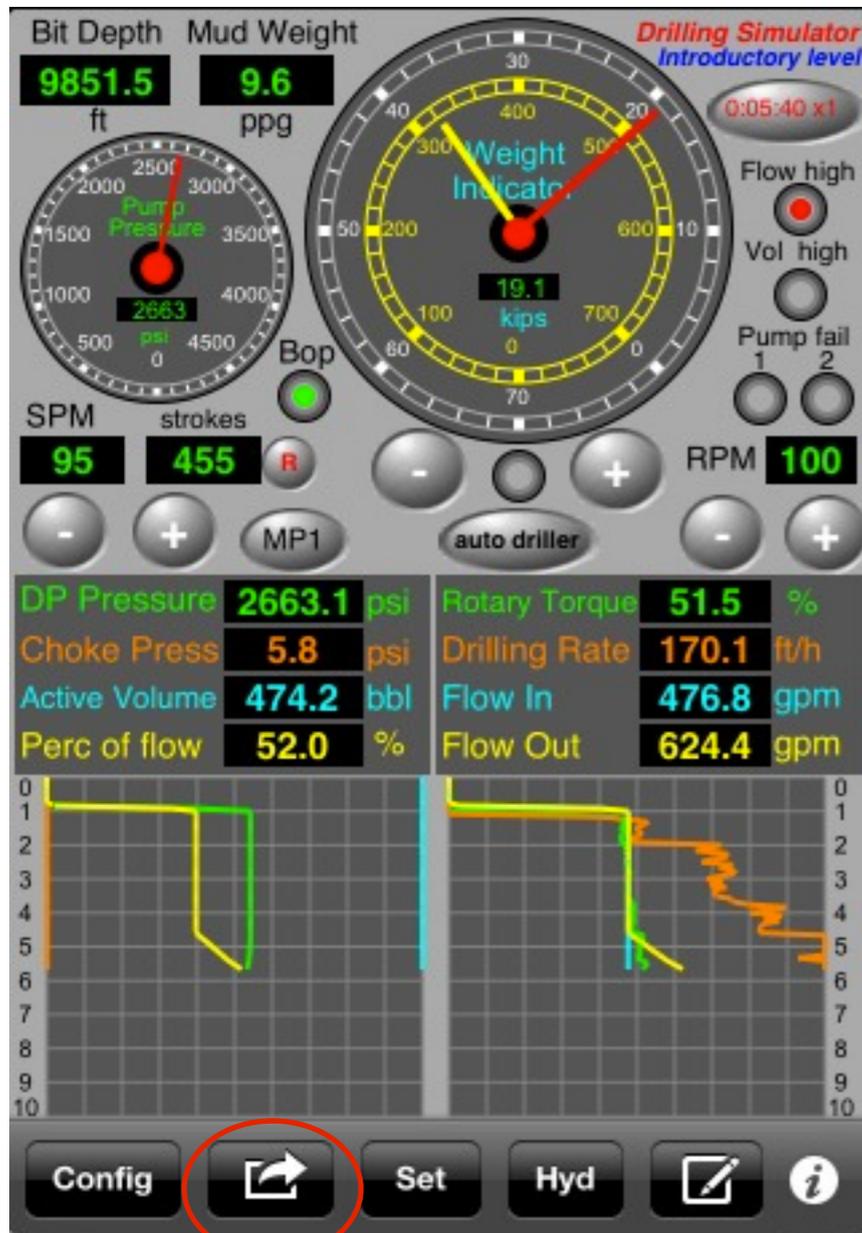
Tap on “**Set**” button to set alarms for kick detection and to reset failure alarms like failure on mud pumps, bop or reset a kick



failure on mud pump #1



Tap on “**Pump 1**” button to reset failure on mud pump #1



Tap on “Options” button

on toolbar and tap on “Graph Settings” button to set the maximum values for the geograph

The graph shows 10 min on graph.

With iPhone on horizontal position, only iPhone 5 / iPod Touch 5 th gen.

### Graph Historical:

This app works with the last 120 min of simulation. After 120 min, occurs a shift from begin.

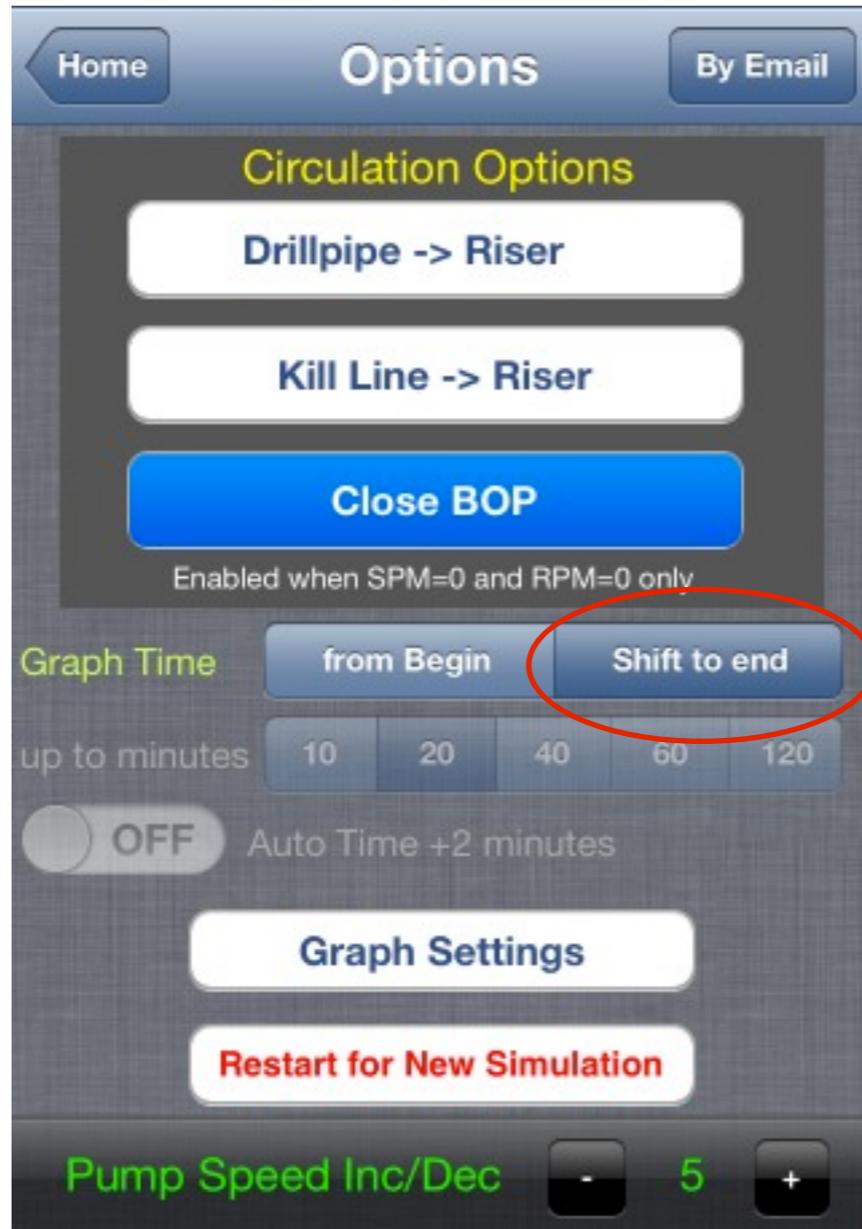
### Reset Graph:

Tap on “Reset Graph” button to reset just the graph.

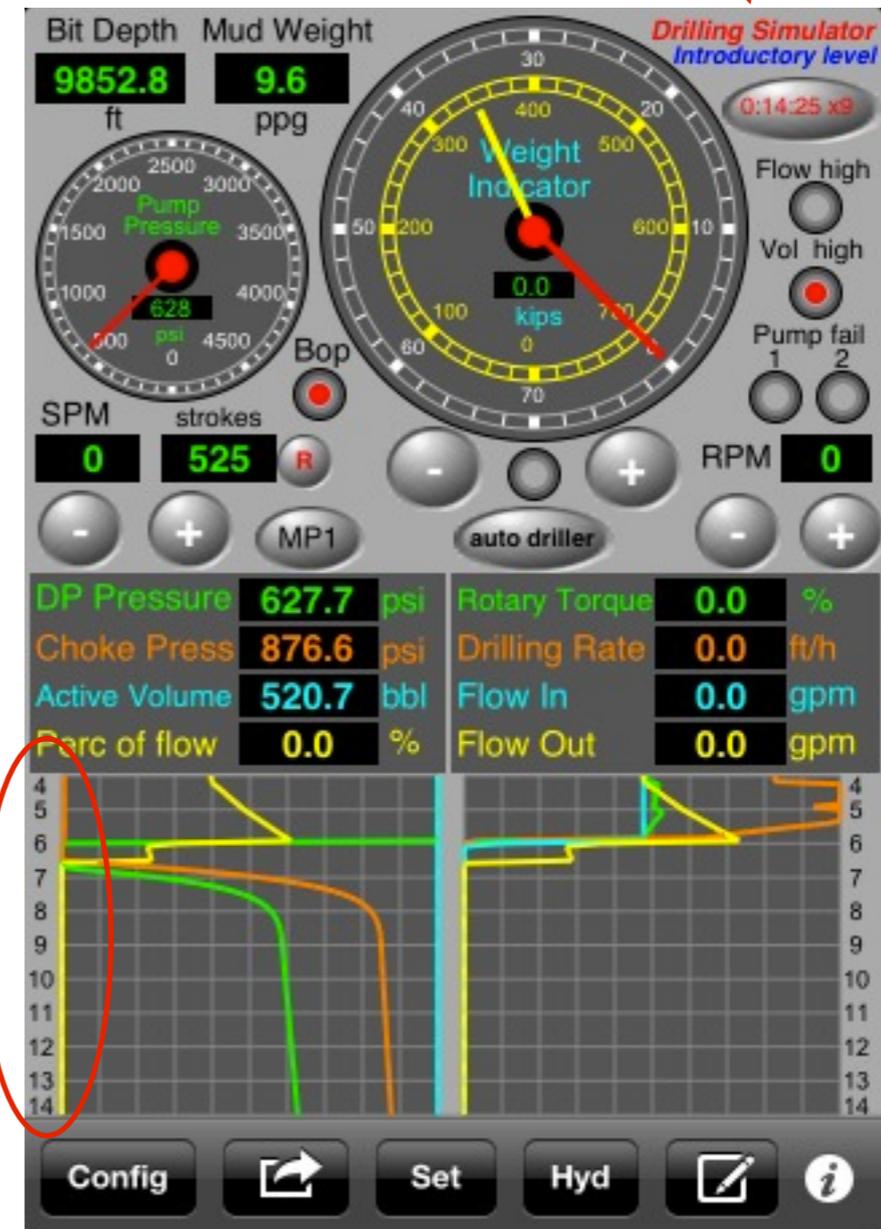
### Instrument Ranges:

Set “Maximum Manometer Pressure” and “Maximum value on Weight Indicator”

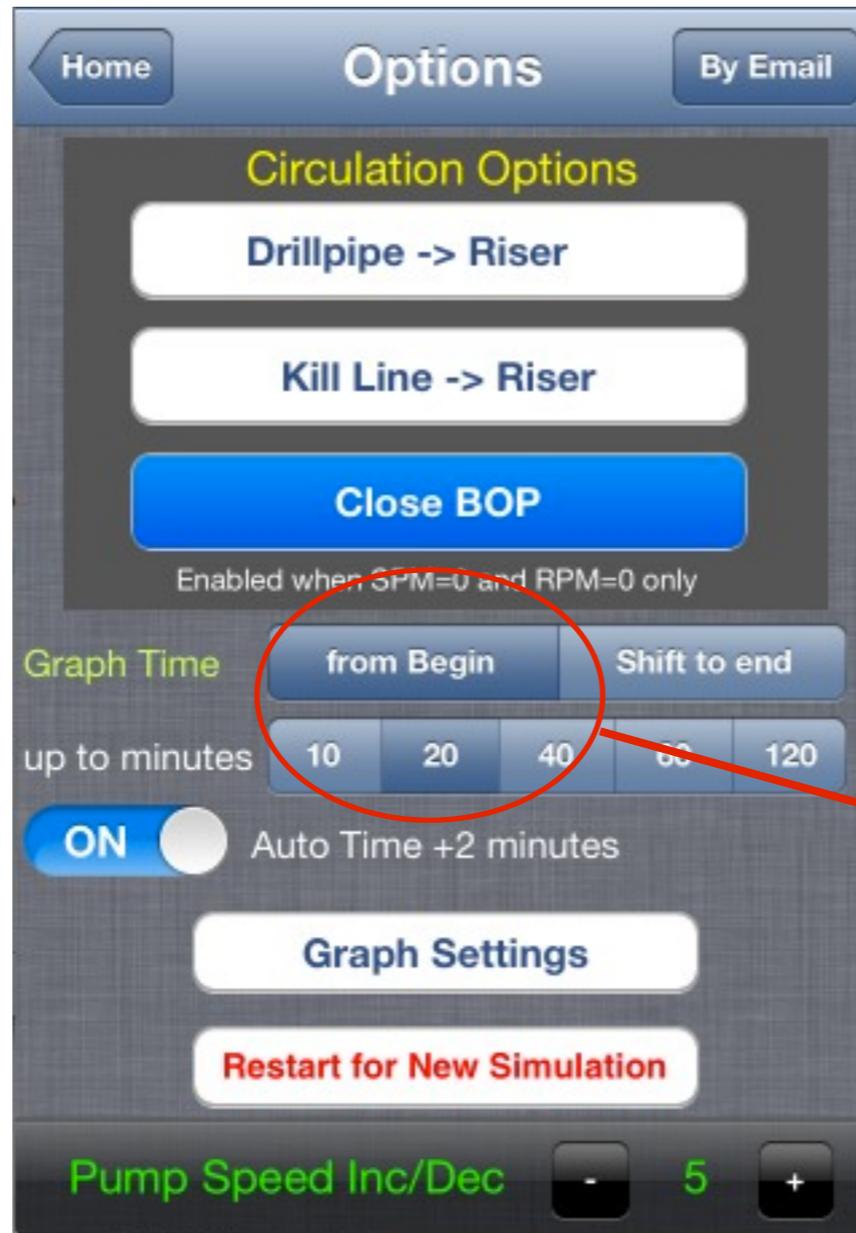
The "Shift to End" graph time option:



interval:  
4 to 14 min



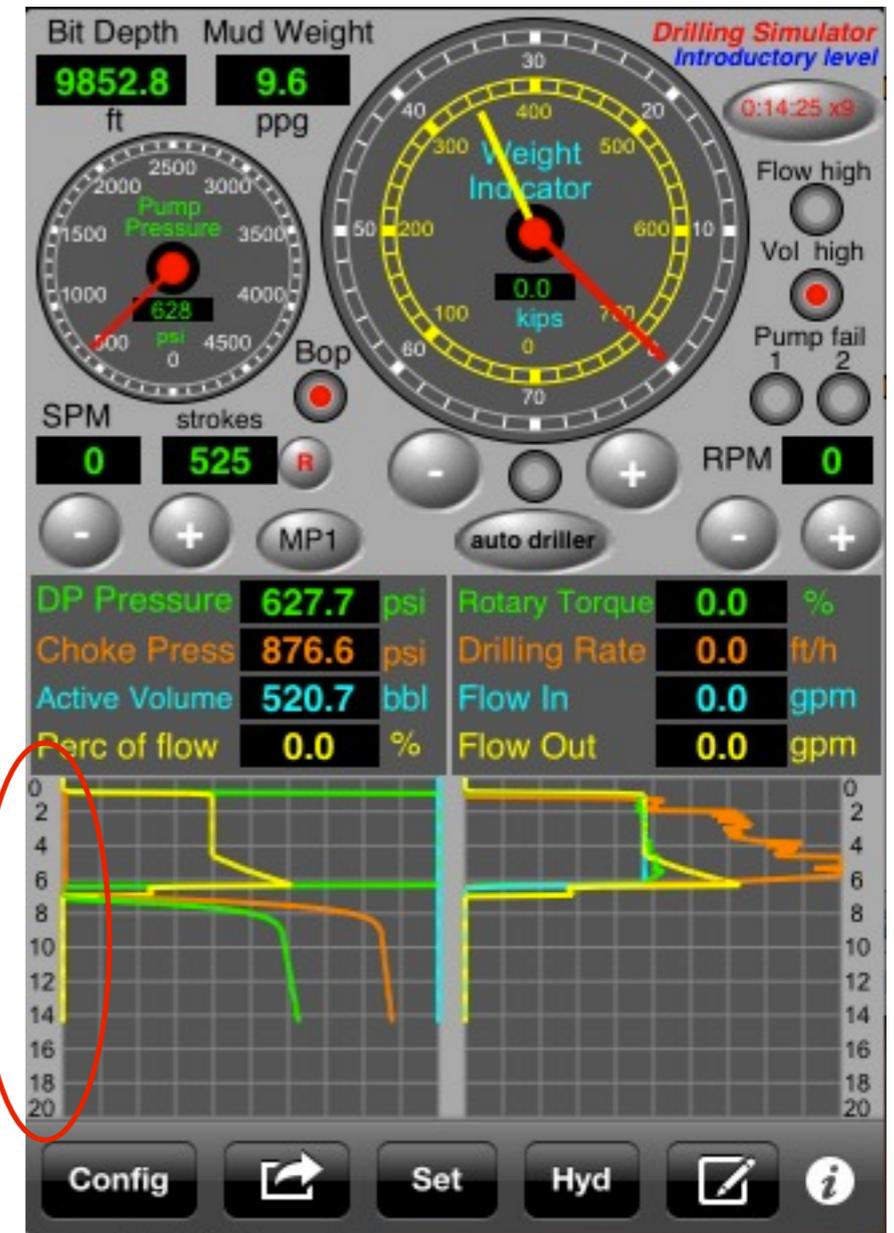
For a interval > 10 min of simulation, select time on Graph to “from Begin” to 10, 20, 40, 60 or 120 min



to 20 min selected →

### Auto time:

Set this switch to **ON** to set a automatic increment of 2 min on graph.  
It is enabled only when **Time** is selected “**from Begin**”.



Set the instruments scale for  
**Pump Pressure Manometer**  
and **Weight Indicator**

Example:

Manometer: 0 to **3000** psi

Weight Indicator: 0 to **400** kips

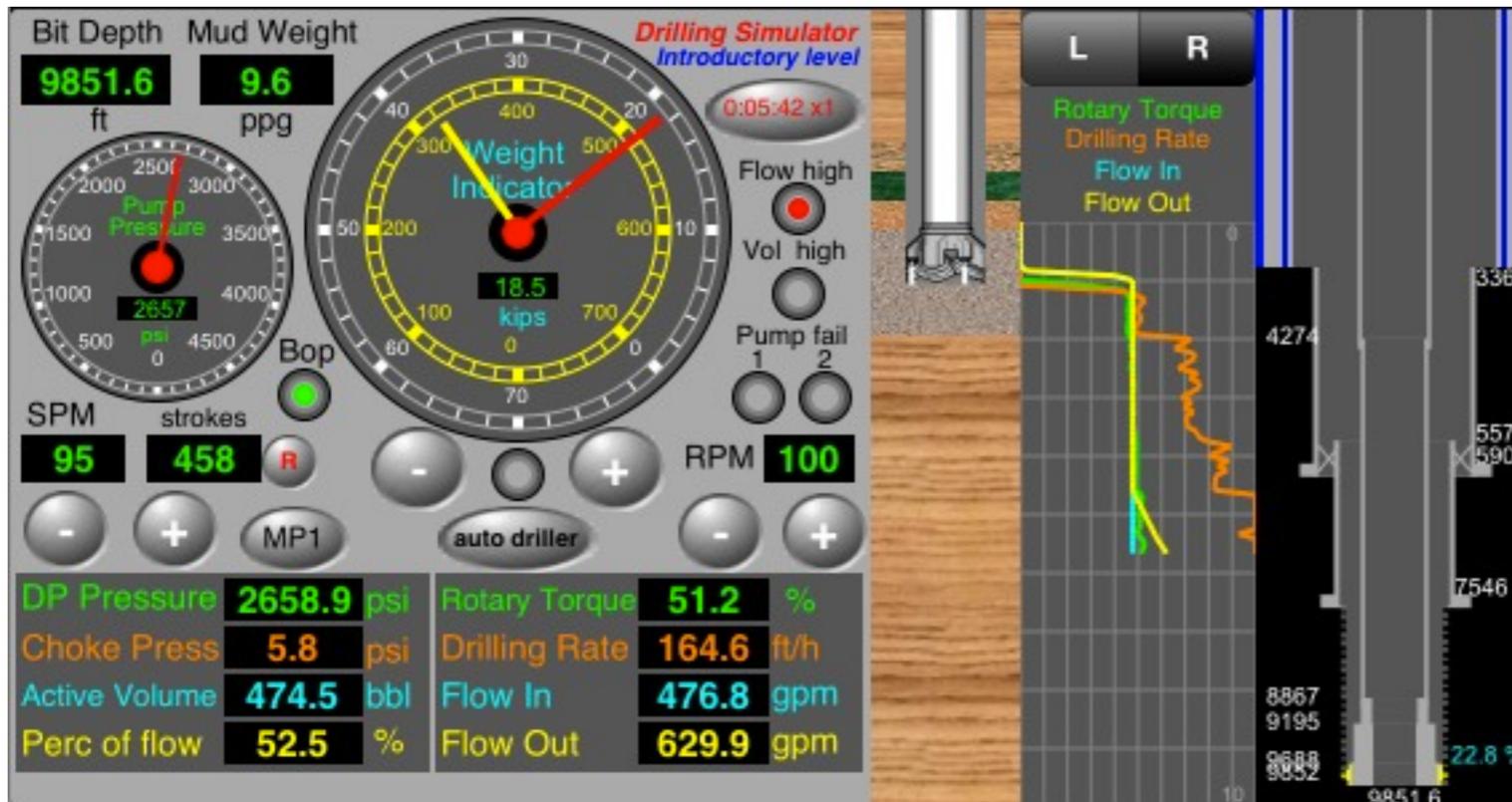


Example:

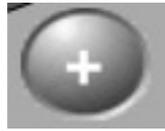
Manometer: 0 to **5000** psi

Weight Indicator: 0 to **800** kips

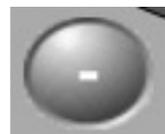
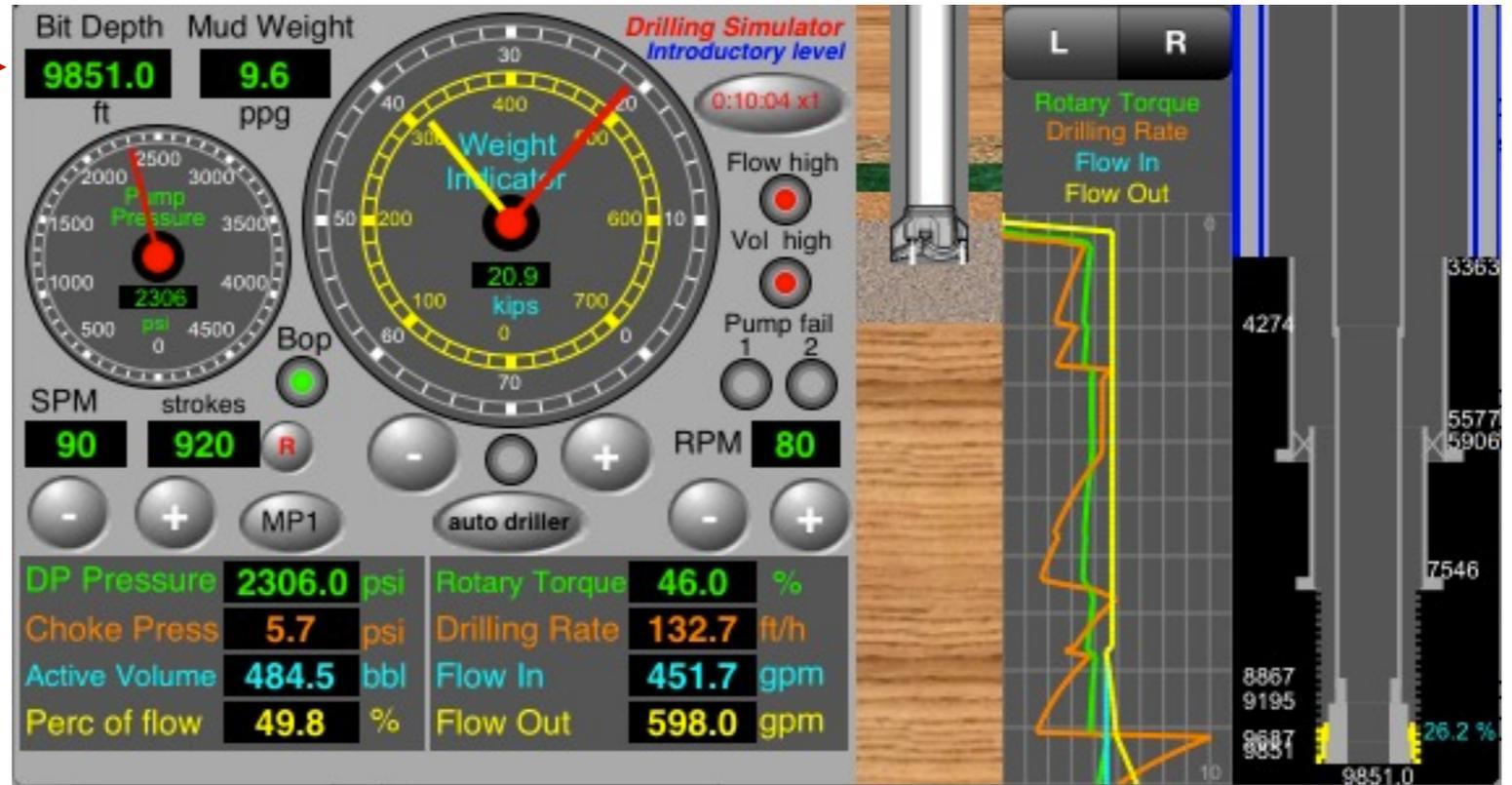




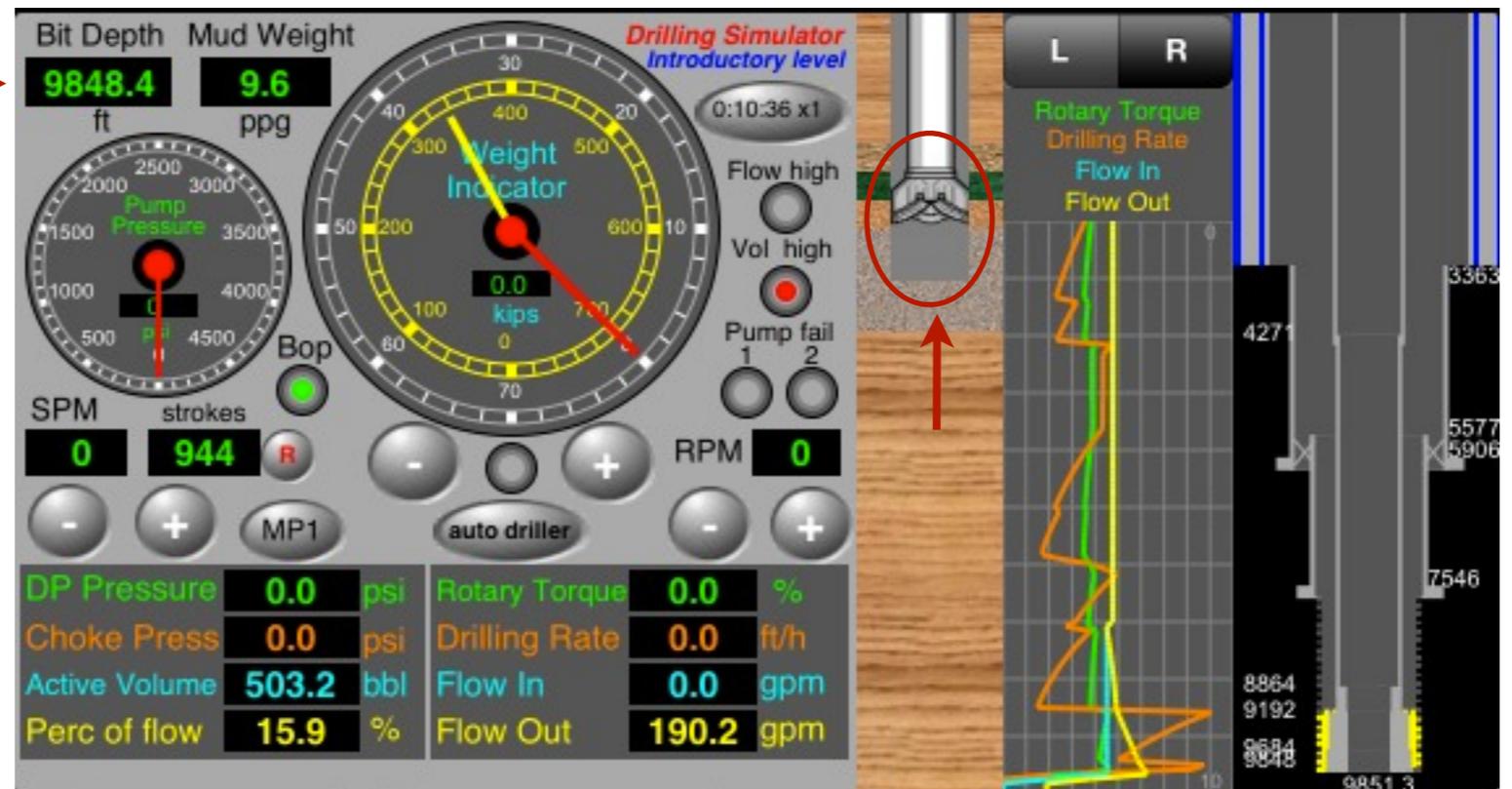
- Moving the Drill String
- Auto Driller
- Hydraulics and Neutral Line
- Kick Detection
- Shut-in the Well
- Stabilization of the Pressures
- Save on iCloud
- Importing by WC Simulator for iPhone
- Importing by WC Simulator for iPad
- The Driller's Method (on iPhone)
- The Wait and Weight Method (on iPhone)
- The Driller's Method (on iPad)
- The Wait and Weight Method (on iPad)
- Fracture on Shoe Depth
- Underground Blowout
- Blowout



Use the button [+] to move down the drill string. When the drill bit reaches on the bottom hole, the WOB (weight on bit) increases.



Use the button [-] to decrement the WOB. When WOB = 0, the drill string is moved to up (off the bottom)



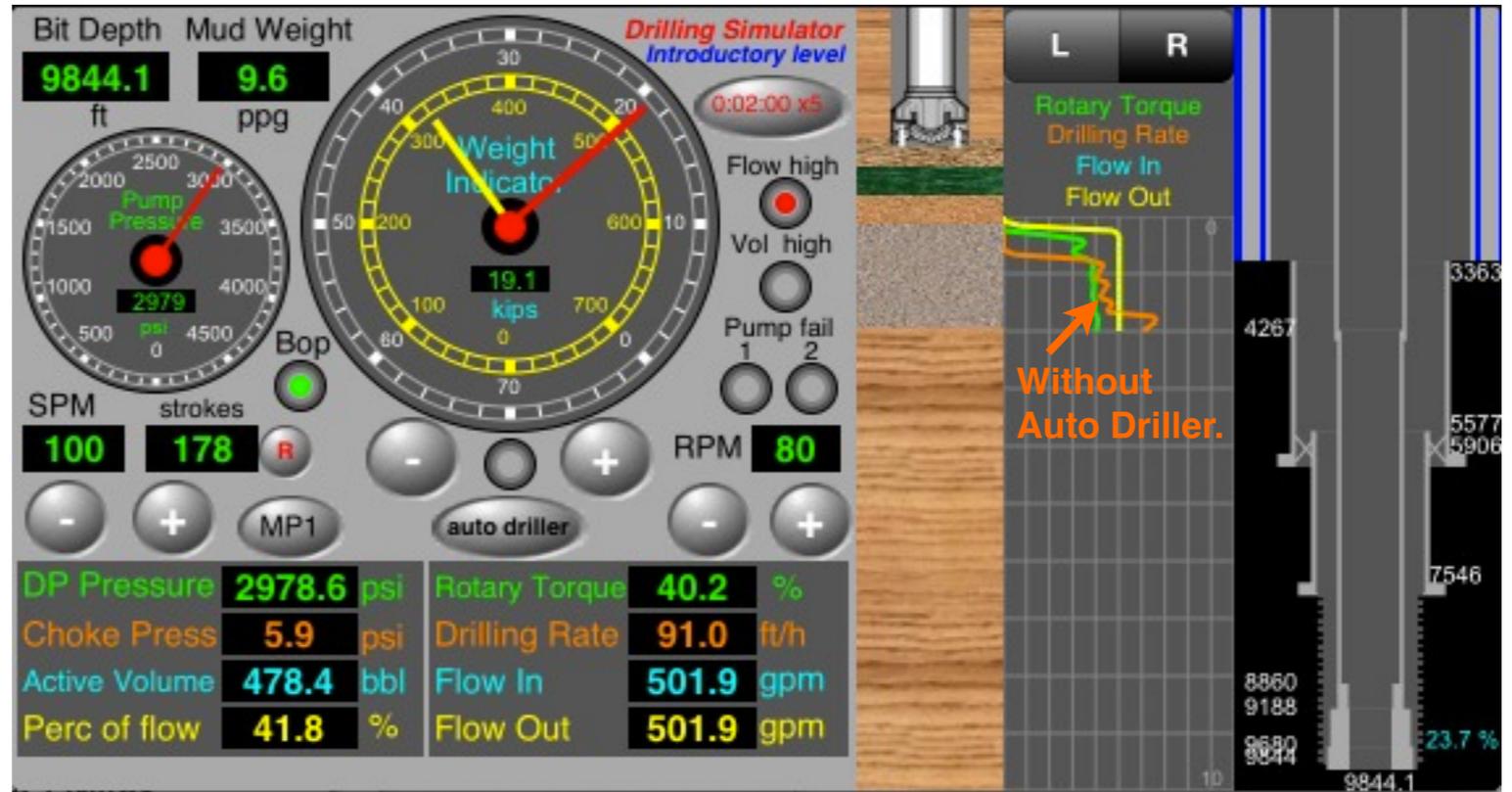
## Auto Driller:

Tap on “auto driller” button to activate or deactivate it.

Without:



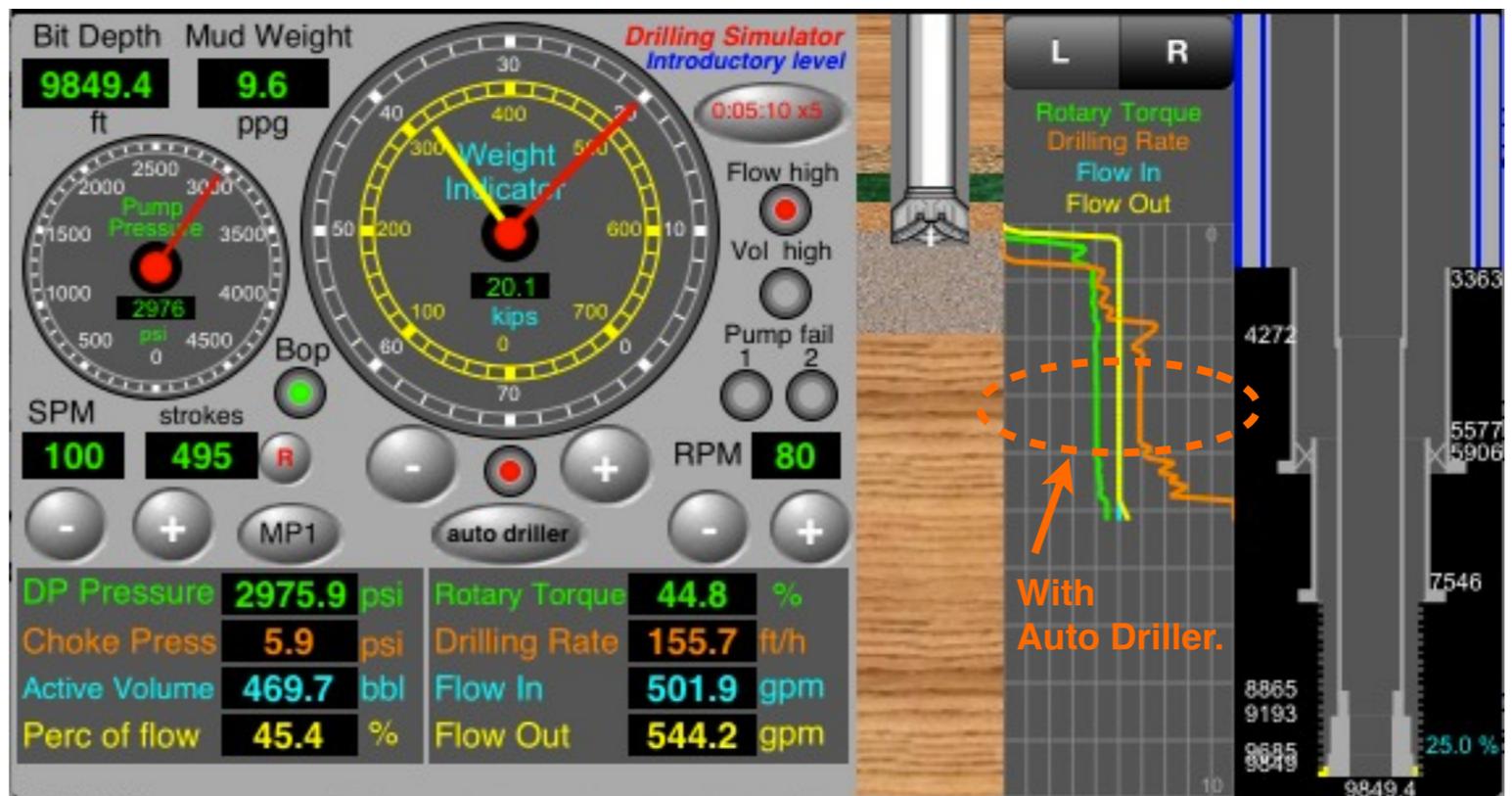
It is necessary to tap on buttons - / + to maintain the **WOB** (weight on bit).



With:



The **WOB** (weight on bit) is constant. It changes automatically to Off if to tap on the buttons - / +



Tap on “Hyd” button to show the Hydraulics View.

- Mud Pumps Informations
- Bottoms-up time
- Drill bit parameters
- System friction losses
- Hydrostatics and Critical Pressure on choke and BOP
- ECD on shoe depth and bottom hole
- Show critical density on shoe (fracture) and the bottom (influx)

Back

## Hydraulics

By Email

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**Pump Press** 2978.9 psi

MP 1	100.0	spm	Flow 1	501.9	gpm
MP 2	0.0	spm	Flow 2	0.0	gpm
MP 3	0.0	spm	Flow 3	0.0	gpm

**Bottoms-up time** 129 min

---

<b>Drill Bit</b>	Flow	501.9	gpm	Surface	27.4	psi
Nozzles Loss		2029.1	psi	Drill string	807.2	psi
Hydraulic Power		10.5	hp/sq.in	Annulus	115.2	psi
% Nozzles Loss		68.1	%	Total Friction	949.8	psi
Jet Velocity		486.1	ft/s			
Impact Force		1208.6	lbf			
Nozzles TFA		0.3313	sq.in			

---

Drill string Hydrost	4908.5	psi	BOP	1683.0	psi
Choke Pressure	5.9	psi	Max	892.3	psi

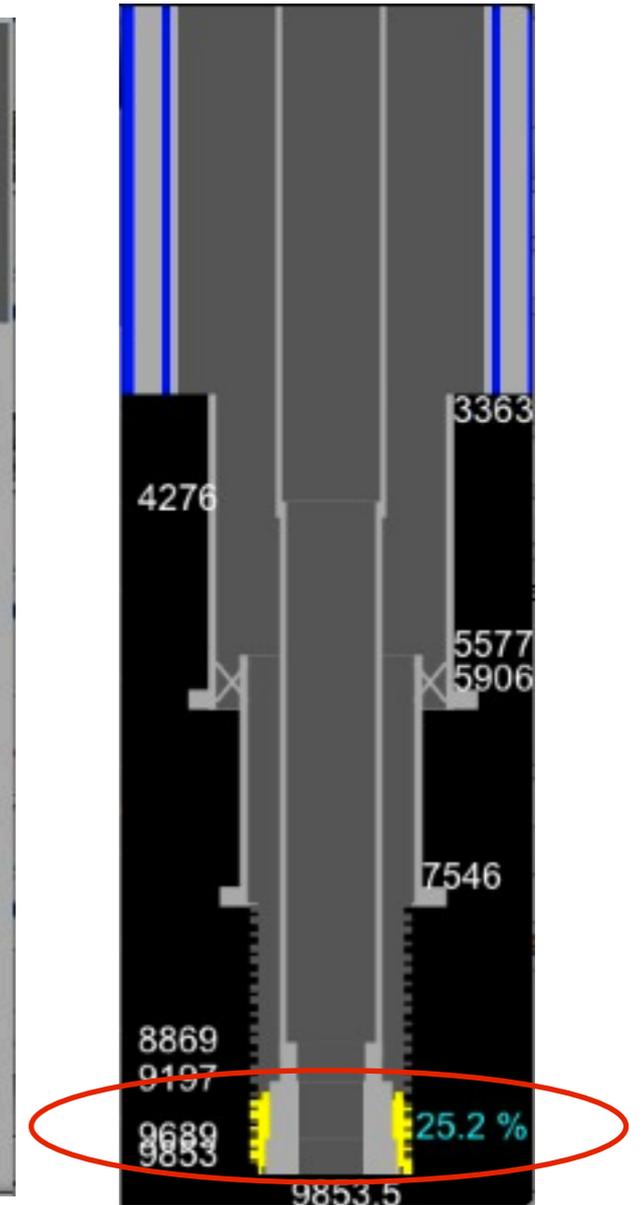
---

	TVD	Hydrost	Friction	ECD	Critical
	ft	psi	psi	ppg	ppg
Shoe	7545.9	3763.2	54.5	9.74	12.00
Bottom	9842.5	4908.5	115.2	9.83	9.50

$$\text{Neutral Line} = \frac{\text{WOB} \rightarrow \text{length}}{\text{BHA} \rightarrow \text{total length}} \times 100$$

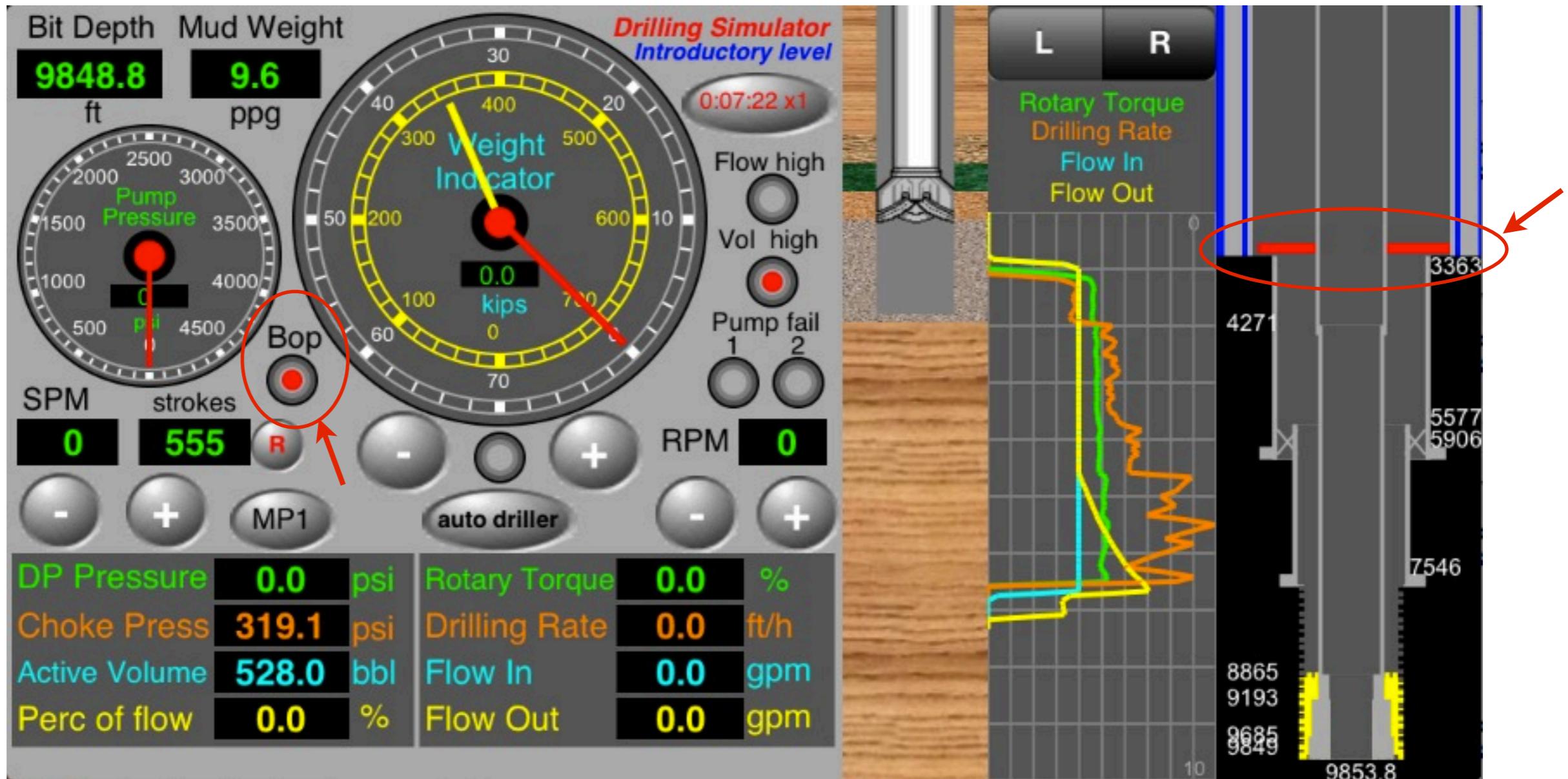
The following kick indications can be observed in the graph during the drilling:

- 1- Decrease in the pump pressure
- 2- Increase in the pit volume (active tank)
- 3- Increase in the percent of flow
- 4- Increase in the rotary torque
- 5- Increase in the drilling rate
- 6- Increase in the flow out

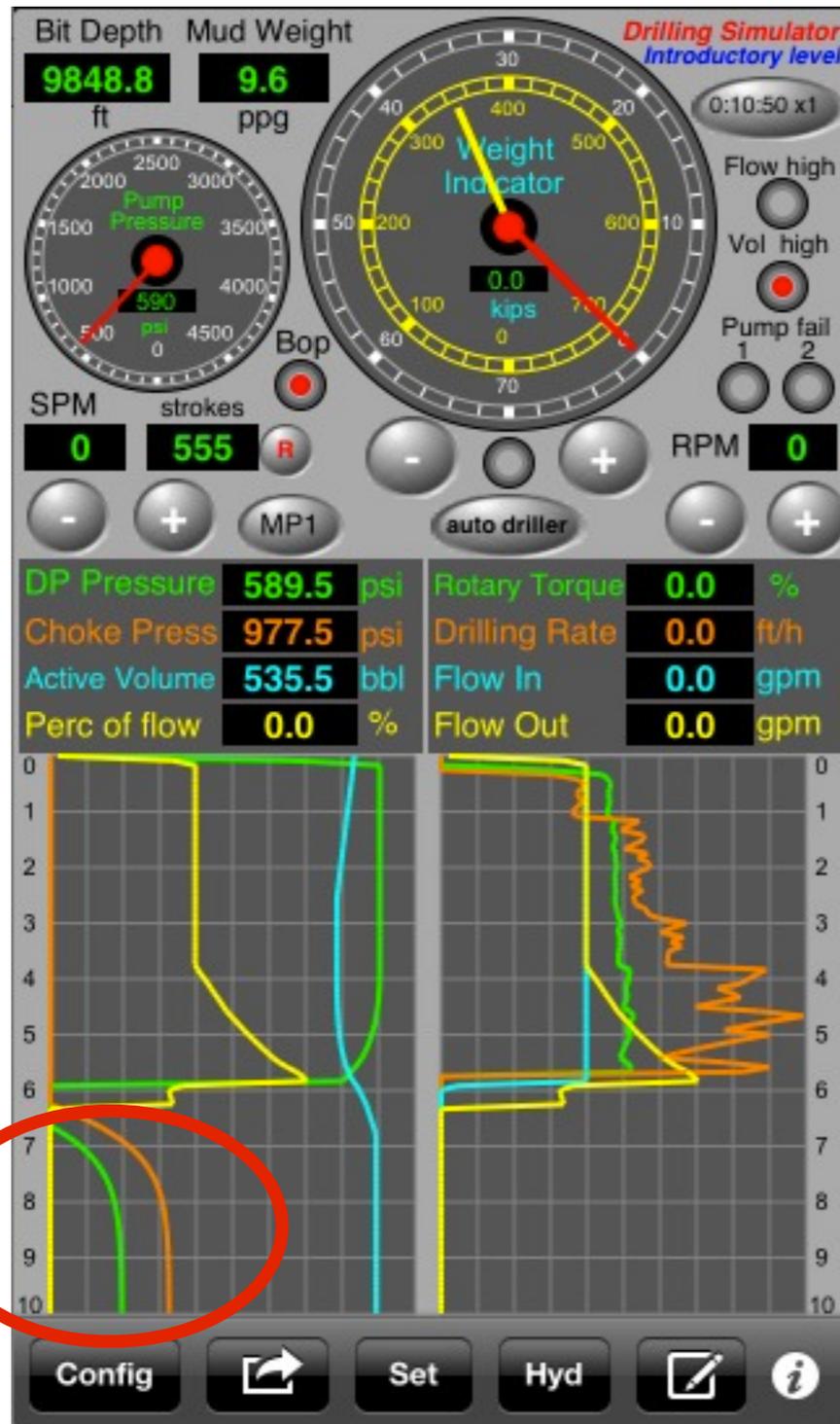


Visual indication with iPhone  
in horizontal position  
(visible in simulation only)

Set RPM=0, SPM=0, WOB=0 and Tap on "Options" button on toolbar and select "Close BOP" button:



Check for the behavior of curves of DP pressure and Choke Pressure on graph. On hydraulics view ECD = Critical Density on Bottom:



ECD = Critical Density on Bottom

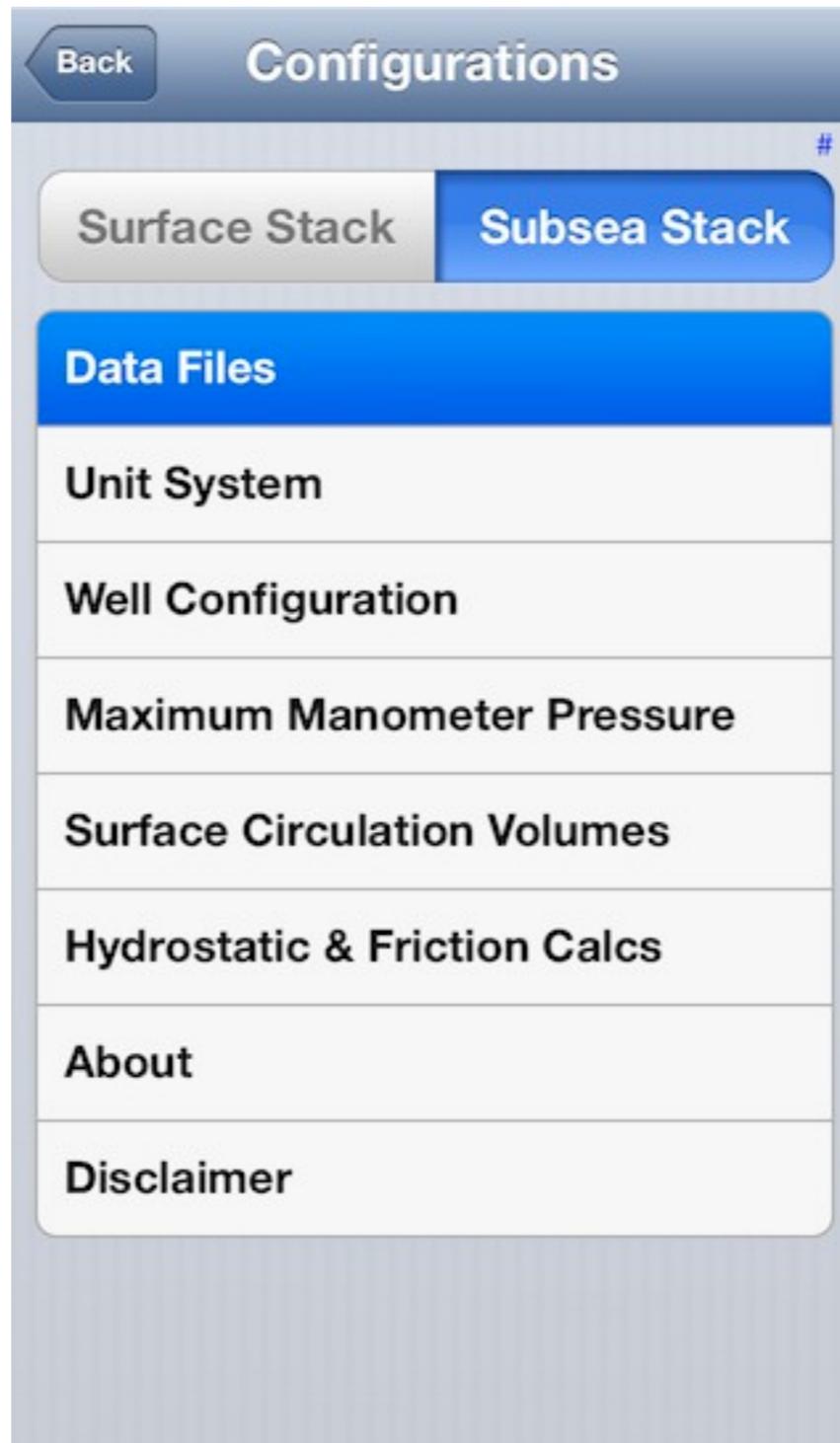
Save after the stabilization of the pressures on iCloud to importing by the app "Well Control Simulation" for control.



Open the "Well Control Simulator" app to Import from "Drilling Simulator" to apply a Method to control.



Tap on "cfg" button in Main View



Select "Data Files"

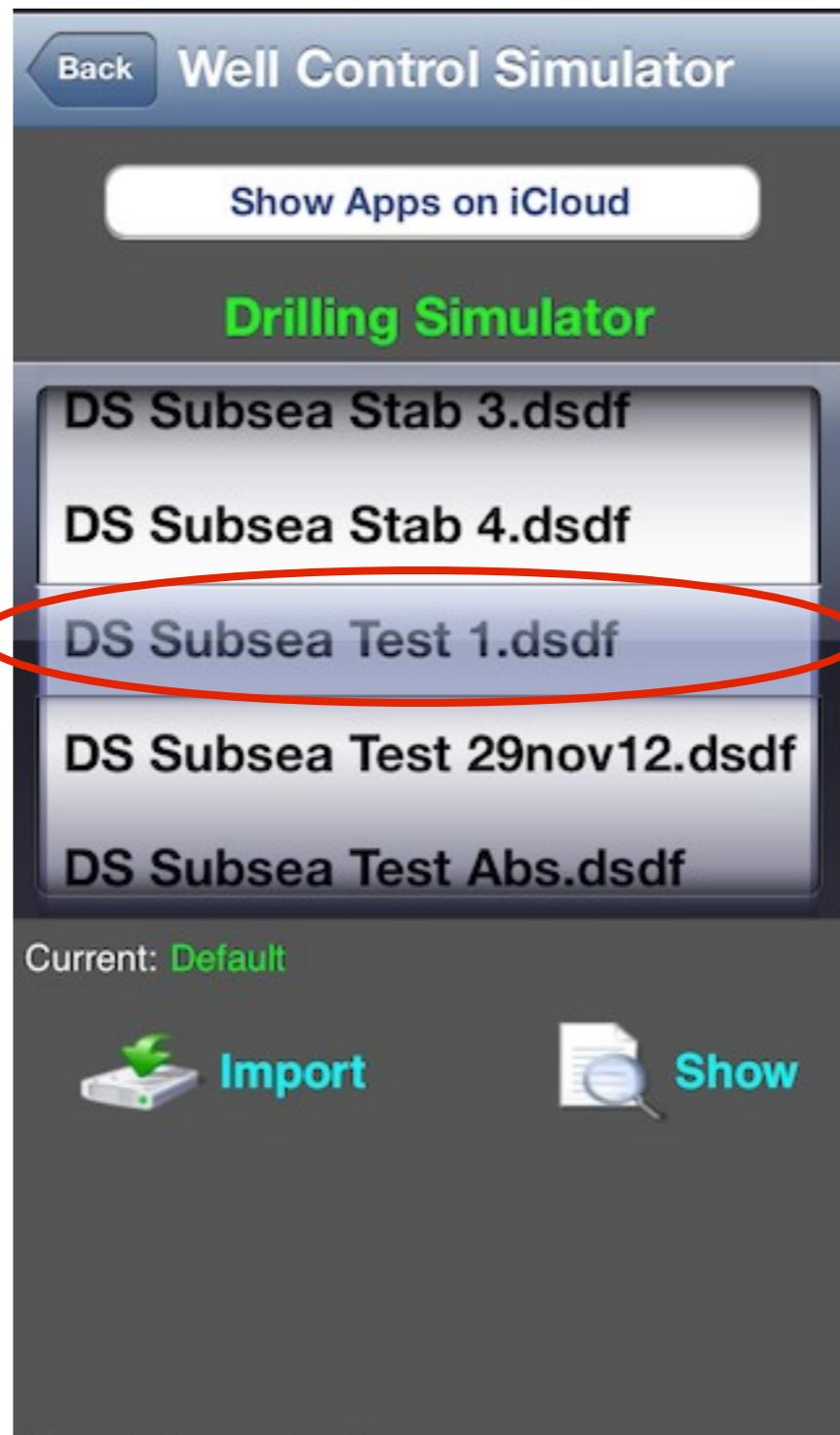


Tap on "Import from ..." button

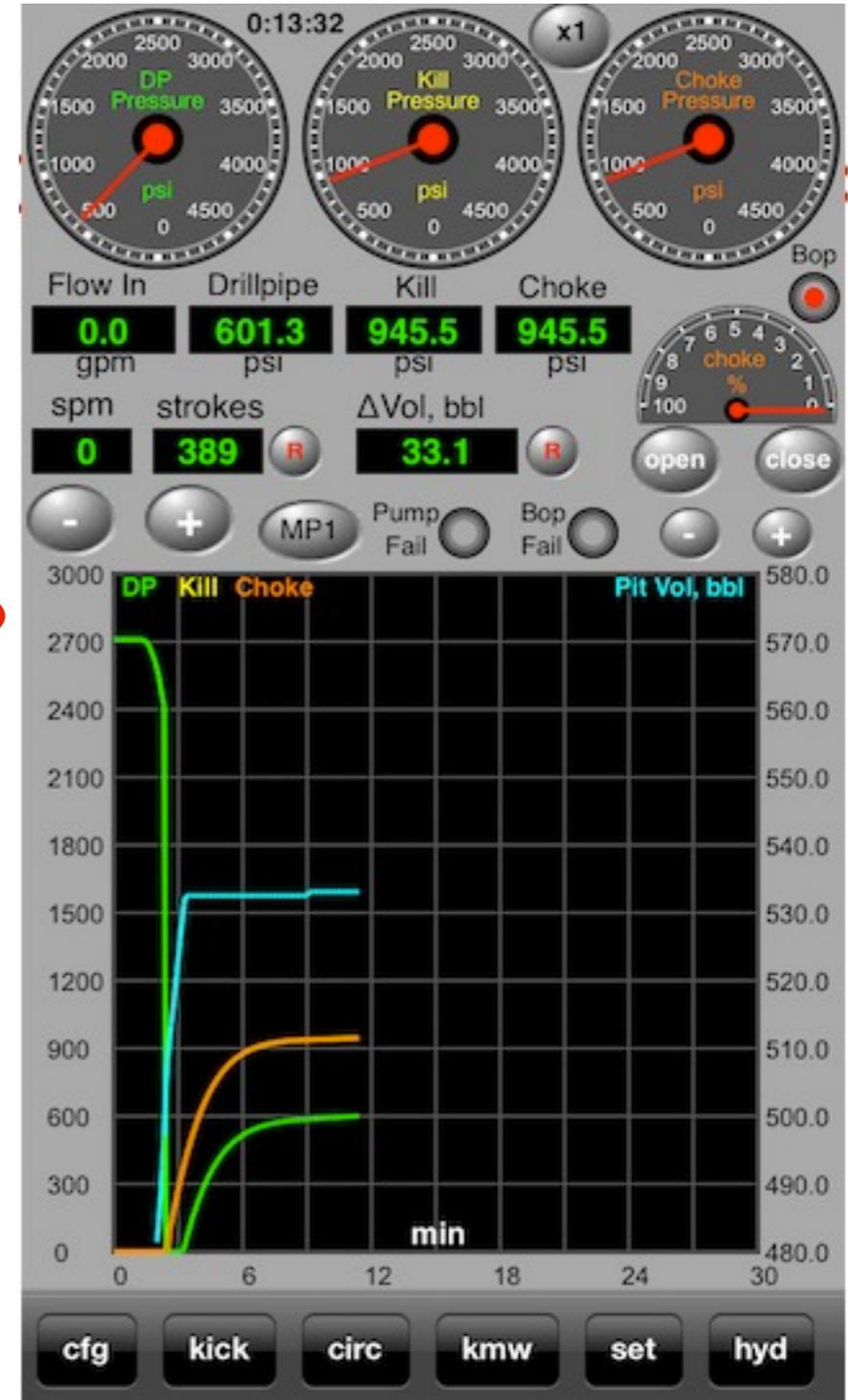
Move to "Drilling Simulator" and Tap on "Select App" button. Select the data file to import.



Tap on "cfg" button in Main View



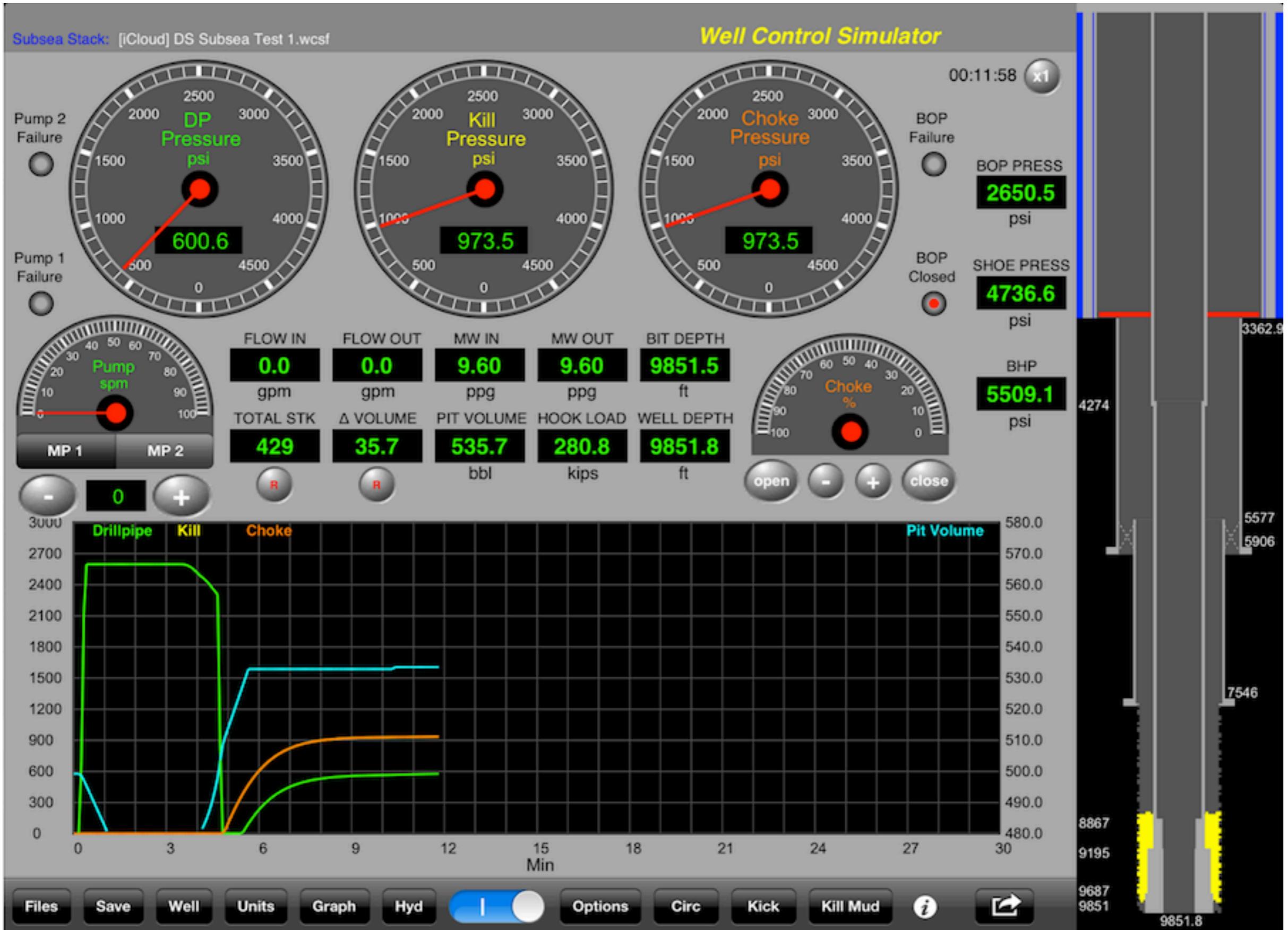
Select "Data Files"



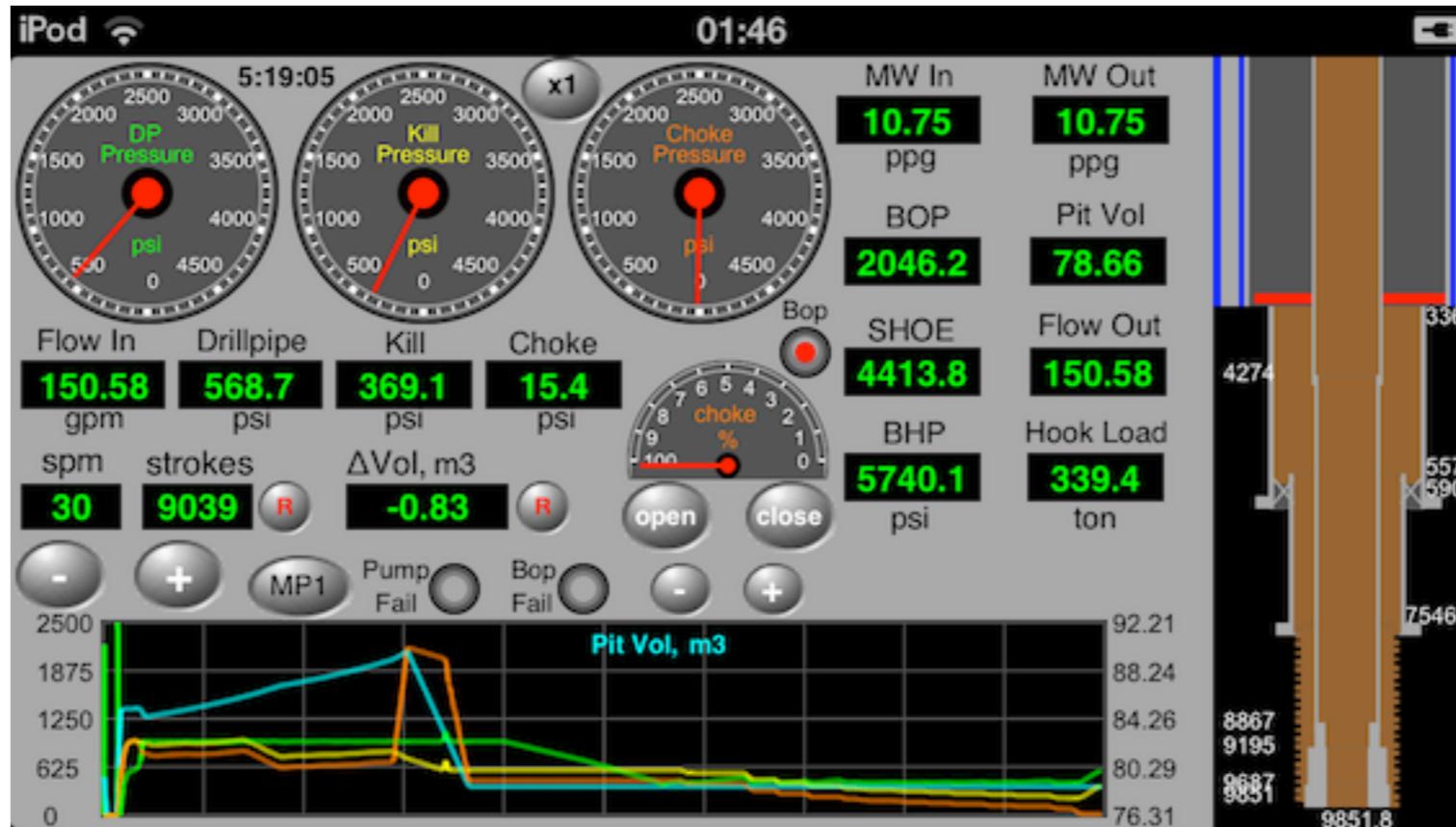
Open the "Well Control Simulator" app to Import from "Drilling Simulator" to apply a Method to control.



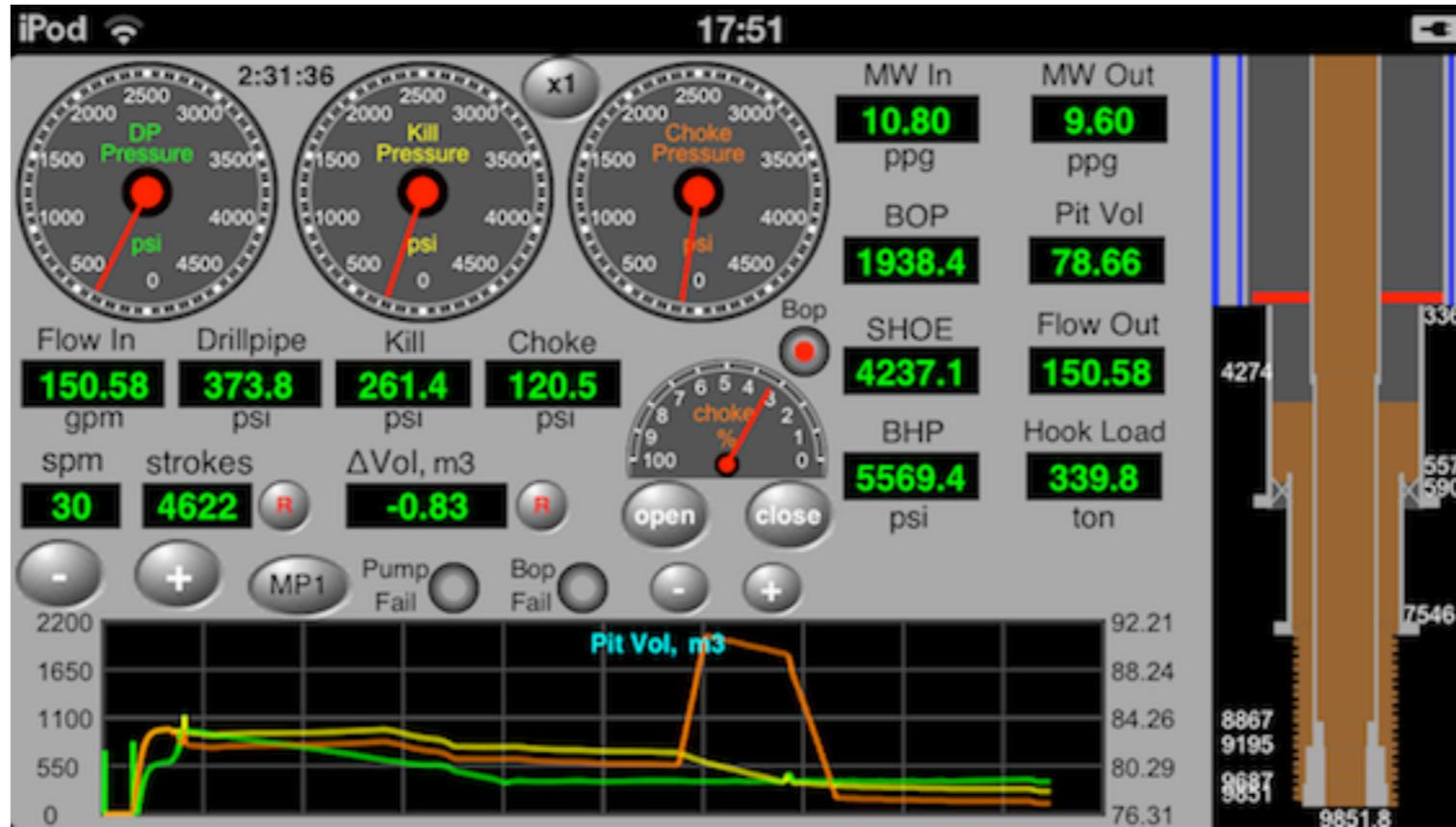
Example after importing from "Drilling Simulator".



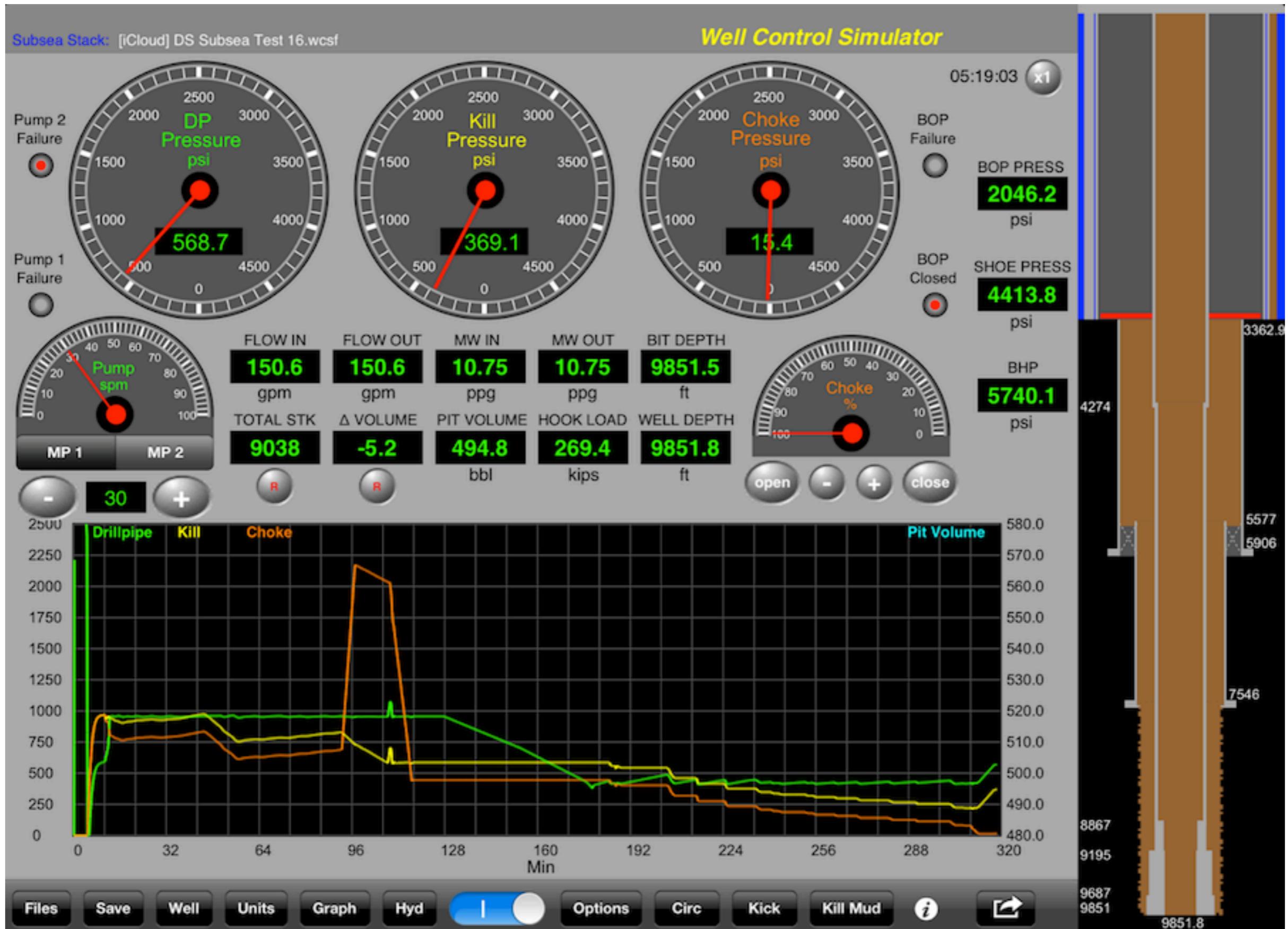
Example of the Driller's method on "Well Control Simulator" app. Check "[Well Control Methods](#)".



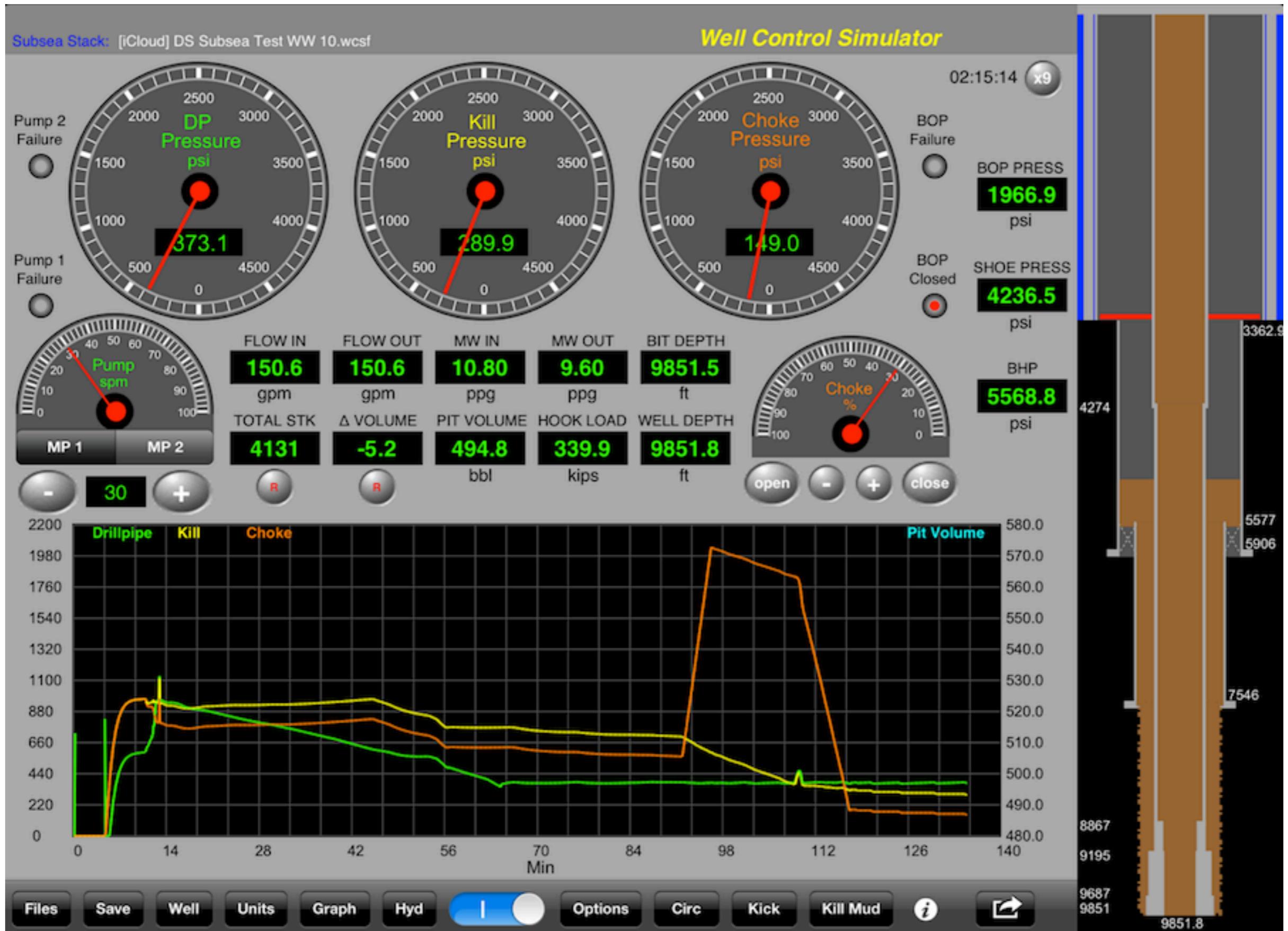
Example of the Driller's method on "Well Control Simulator" app. Check "[Well Control Methods](#)".



Example of the Driller's method on "Well Control Simulator" app. Check "[Well Control Methods](#)" or "[Well Control Worksheets](#)" apps.



The Wait and Weight method on “Well Control Simulator” app. Check “Well Control Methods” or “Well Control Worksheets” apps.



Check for the **choke pressure** to reach the **maximum choke pressure**. On hydraulics view, ECD = Critical Density on Shoe Depth:

Back **Hydraulics** By Email

Pump Press **602.6** psi Bottoms -up time **-** min

MP 1	0.0	spm	Flow 1	0.0	gpm
MP 2	0.0	spm	Flow 2	0.0	gpm
MP 3	0.0	spm	Flow 3	0.0	gpm

**Drill Bit** Flow **0.0** gpm Surface **0.0** psi

Nozzles Loss **0.0** psi Drill string **0.0** psi

Hydraulic Power **0.0** hp/sq.in Annulus **0.0** psi

% Nozzles Loss **0.0** % Total Friction **0.0** psi

Jet Velocity **0.0** ft/s

Impact Force **0.0** lbf

Nozzles TFA **0.3313** sq.in

Drill string Hydrat **4008.5** psi BOP **2663.1** psi

**Choke Pressure** **986.1** psi **Max** **987.8** psi

	TVD ft	Hydrost psi	Friction psi	ECD ppg	Critical ppg
Shoe	7545.9	3763.2	0.0	12.12	12.12
Bottom	9842.5	4525.0	0.0	10.78	10.75

Drilling Simulator  
Introductory level

Bit Depth **9848.8** ft Mud Weight **9.6** ppg

Pump Pressure **602.6** psi

Weight Indicator **0.0** kips

SPM **0** strokes RPM **0**

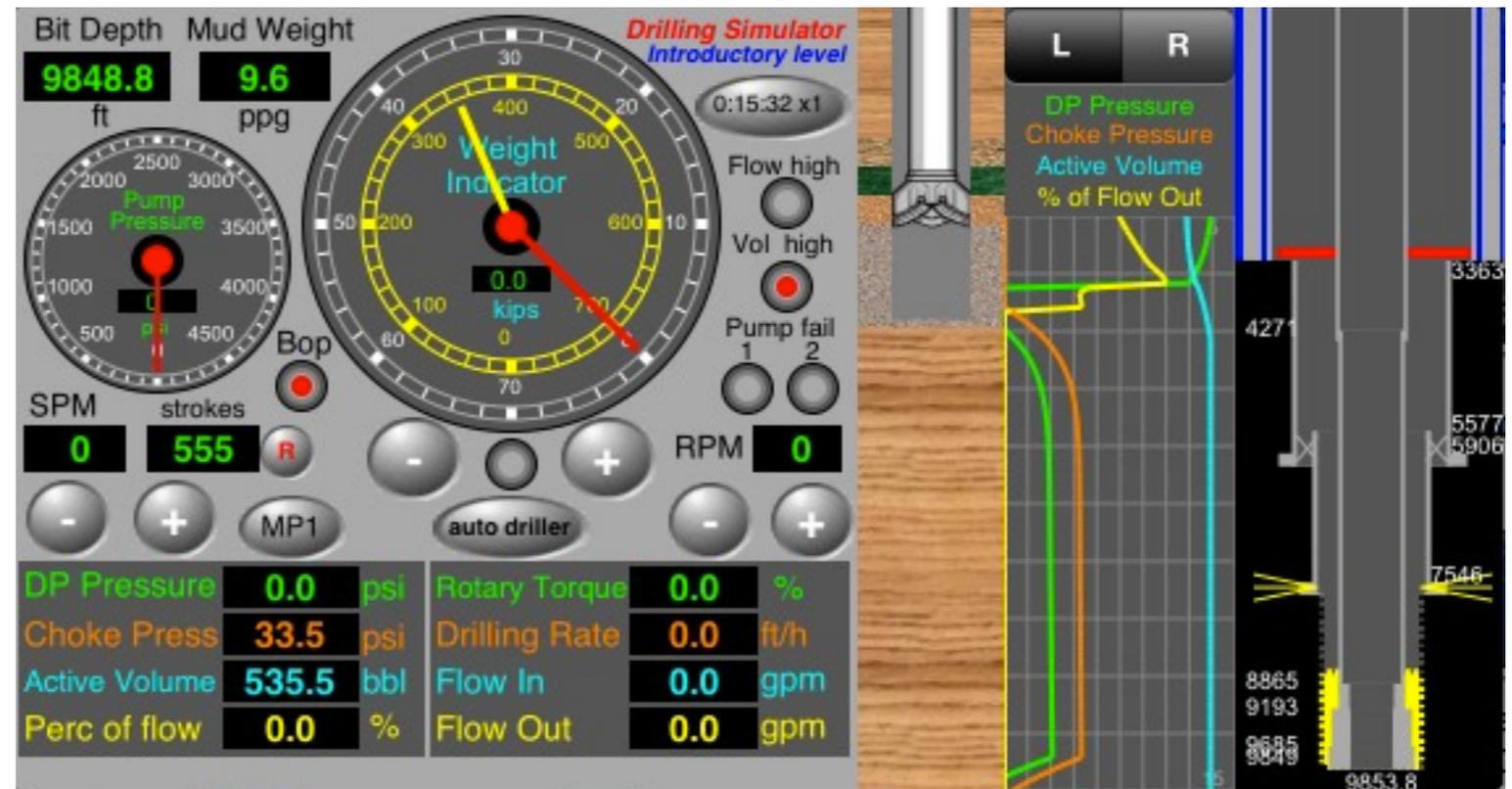
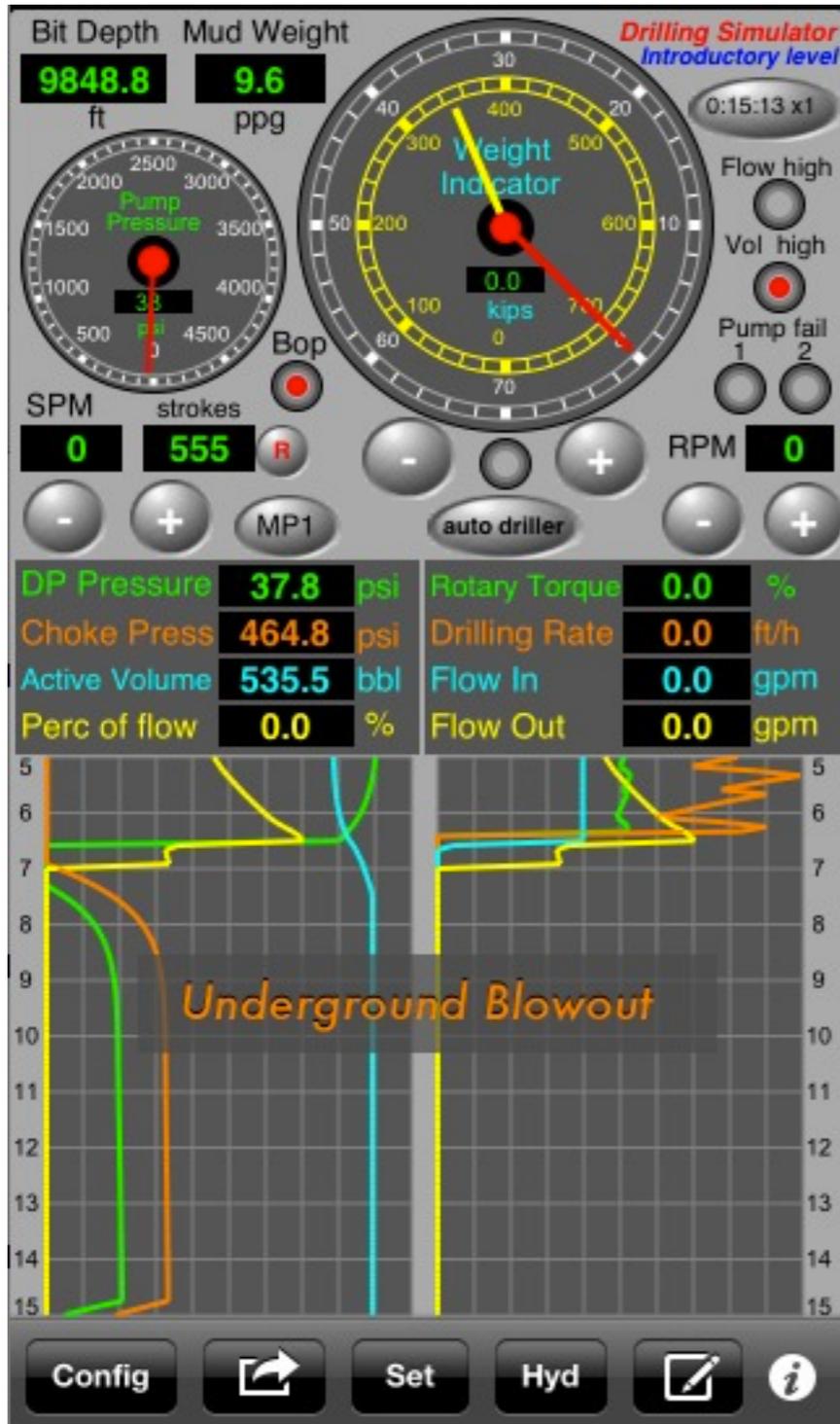
DP Pressure **0.0** psi Rotary Torque **0.0** %

Choke Press **33.5** psi Drilling Rate **0.0** ft/h

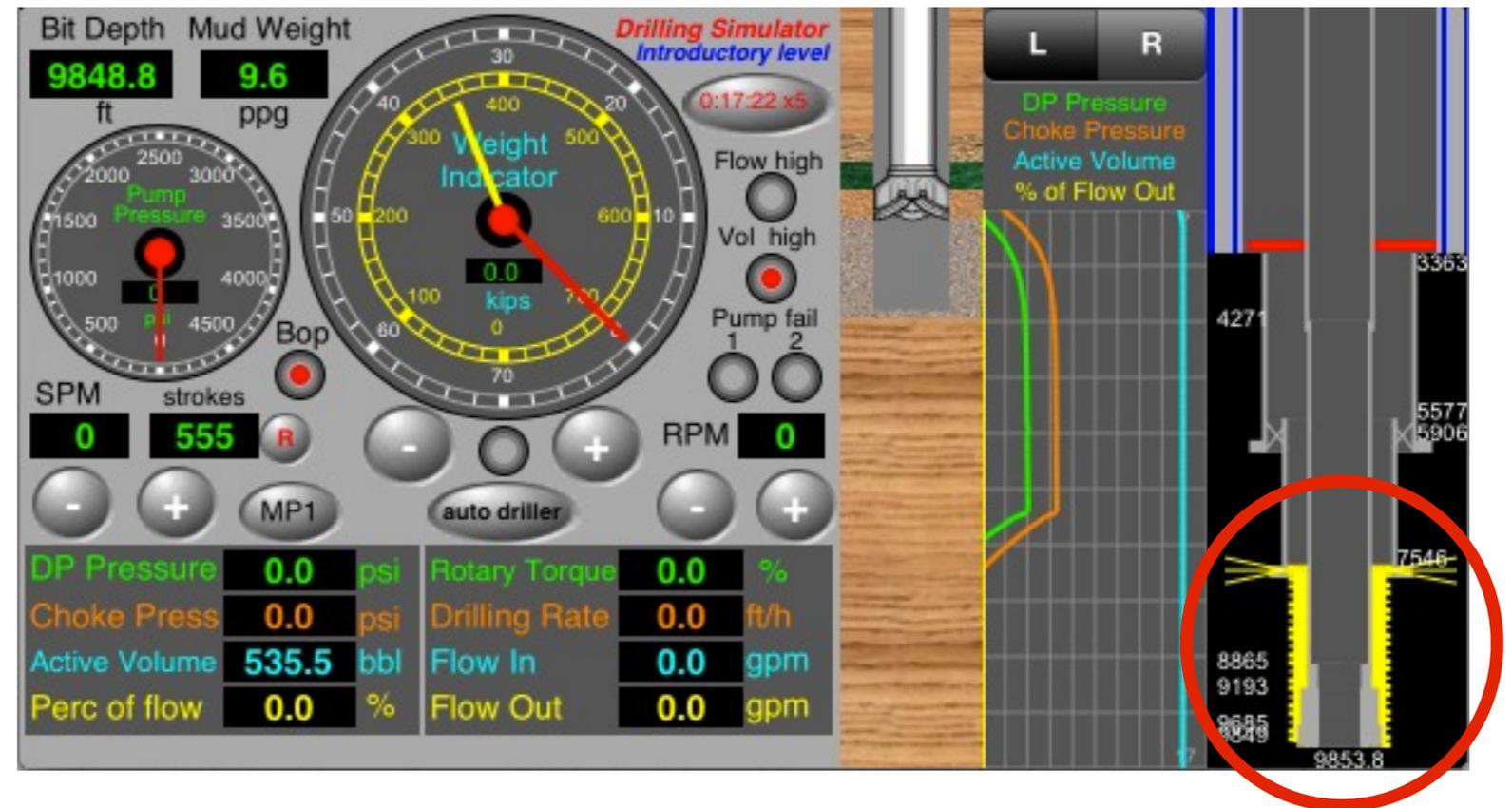
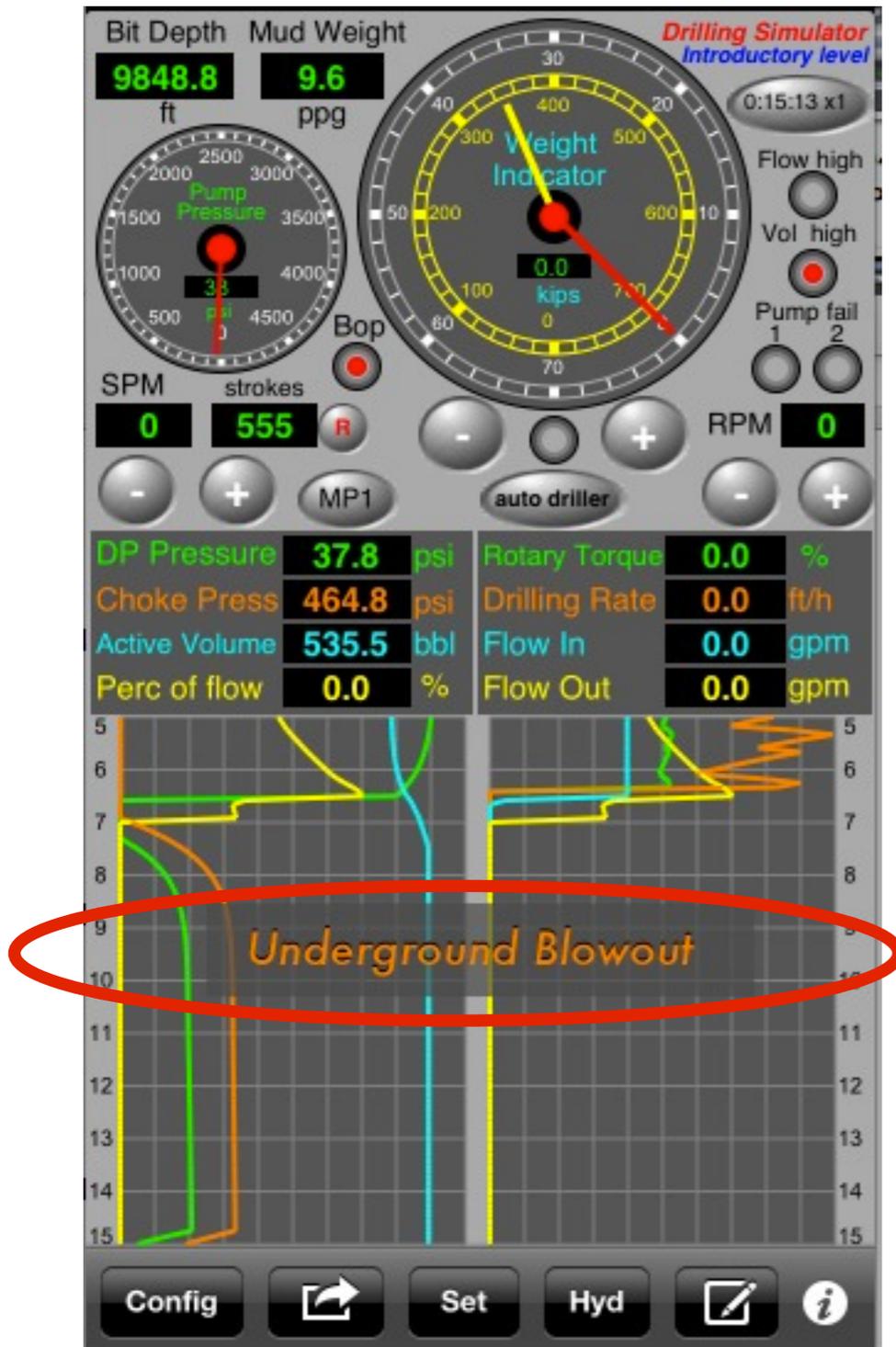
Active Volume **535.5** bbl Flow In **0.0** gpm

Perc of flow **0.0** % Flow Out **0.0** gpm

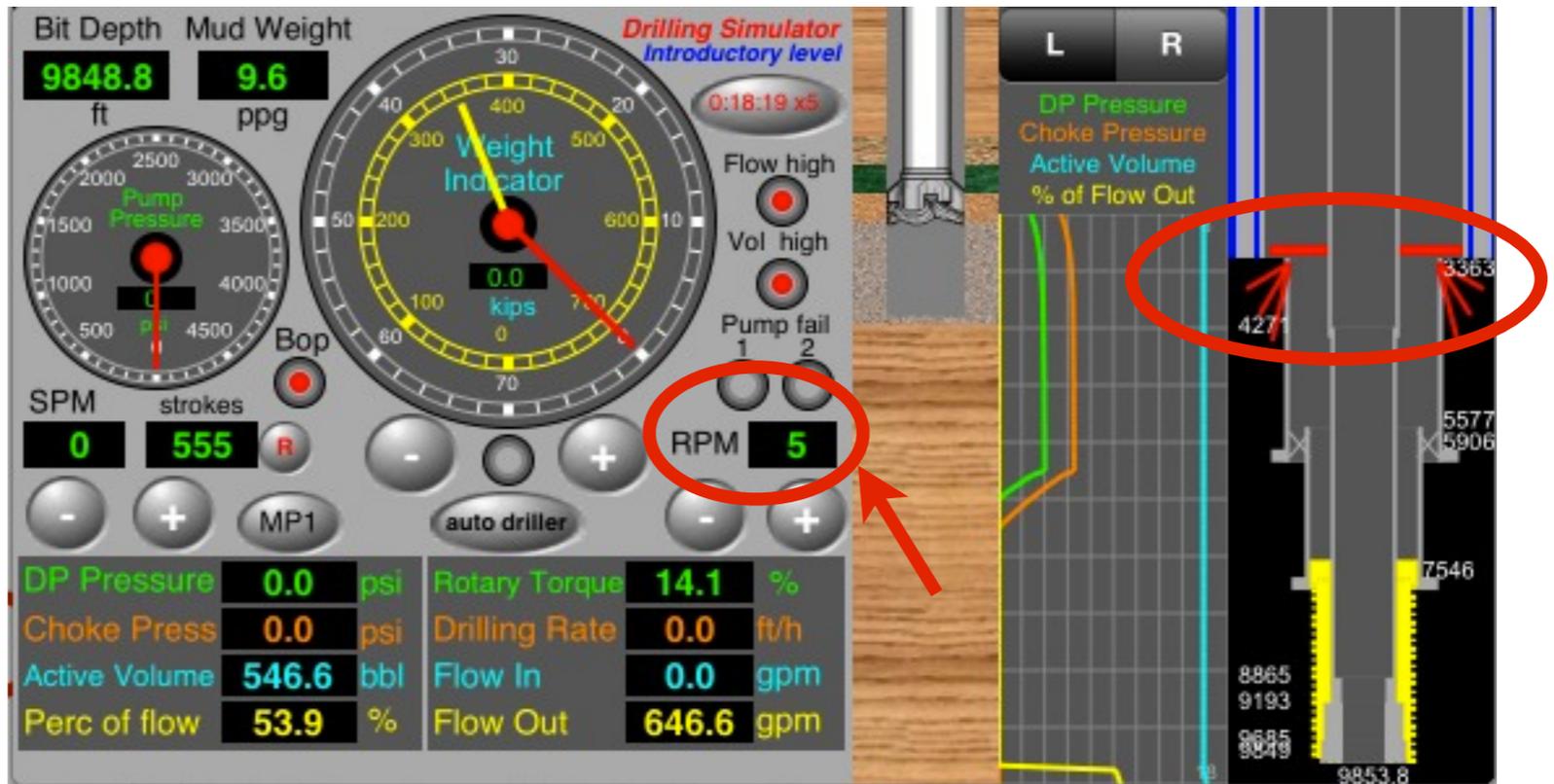
Shows the expression "Underground Blowout" in the graph with iPhone on vertical. Flashing until gas to reach on the shoe depth.



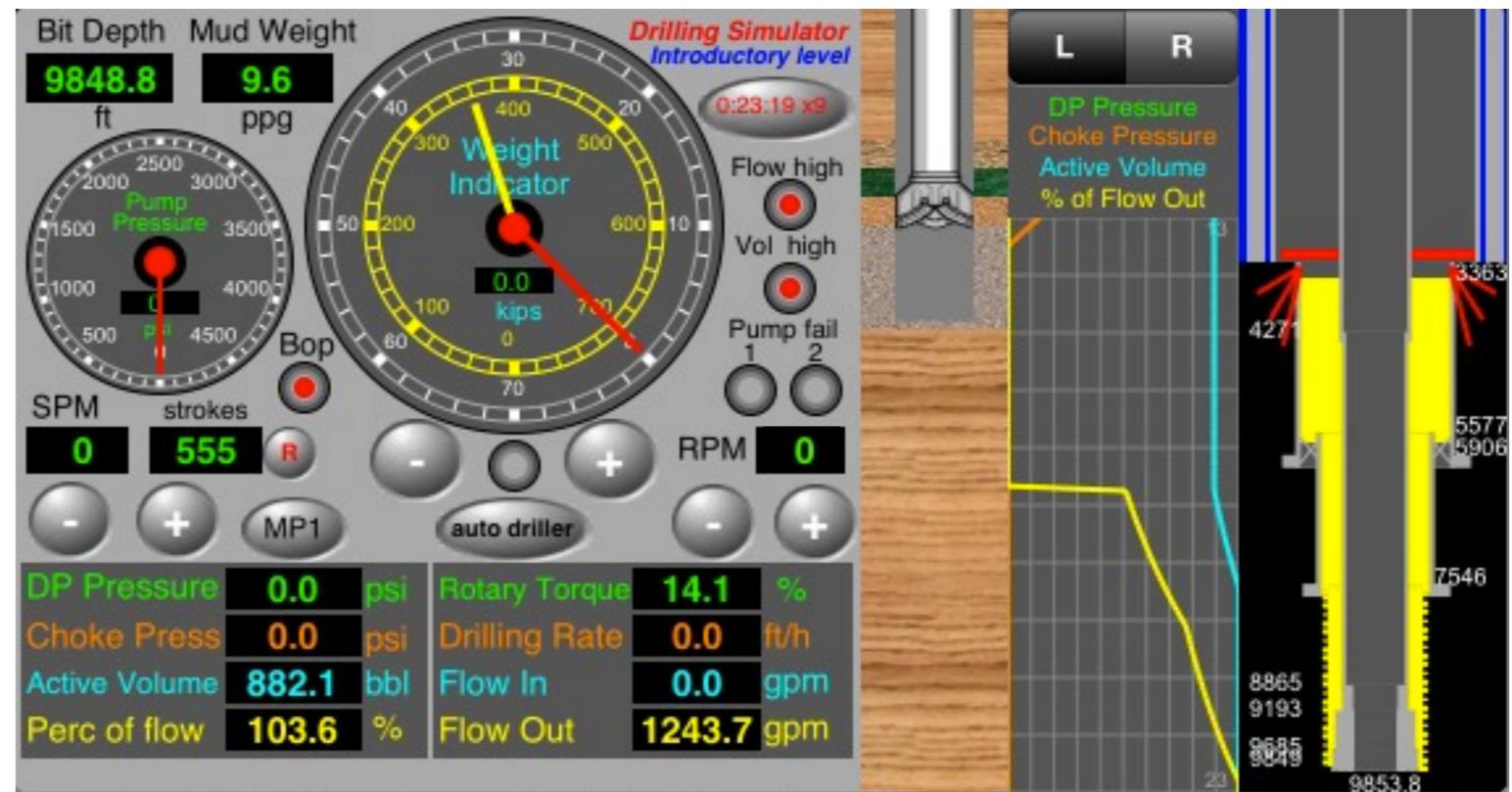
Shows the expression "Underground Blowout" in the graph. Flashing until gas to reach on the shoe depth.



With Bop closed, set RPM = 5 to occur failure on the BOP.



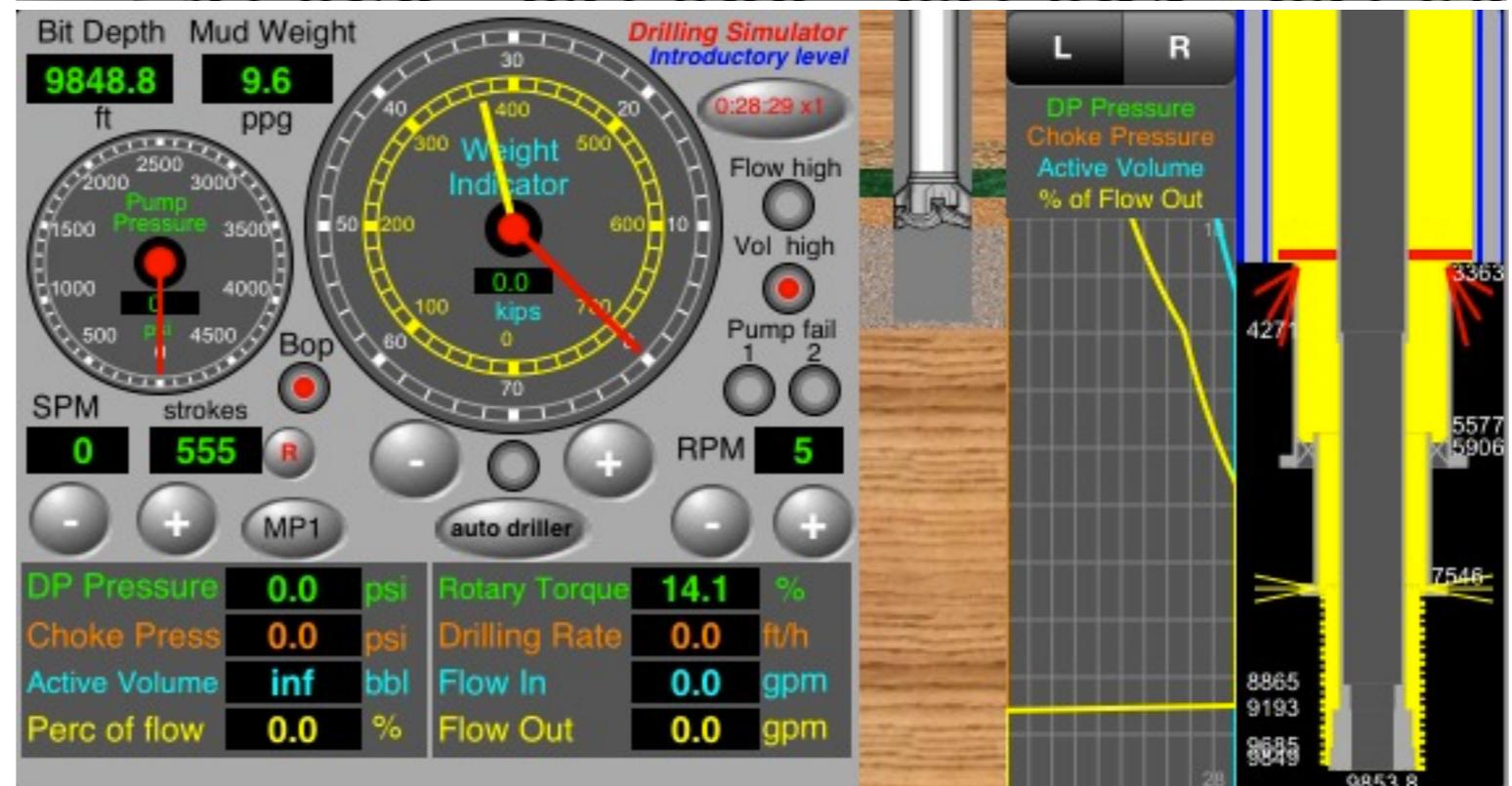
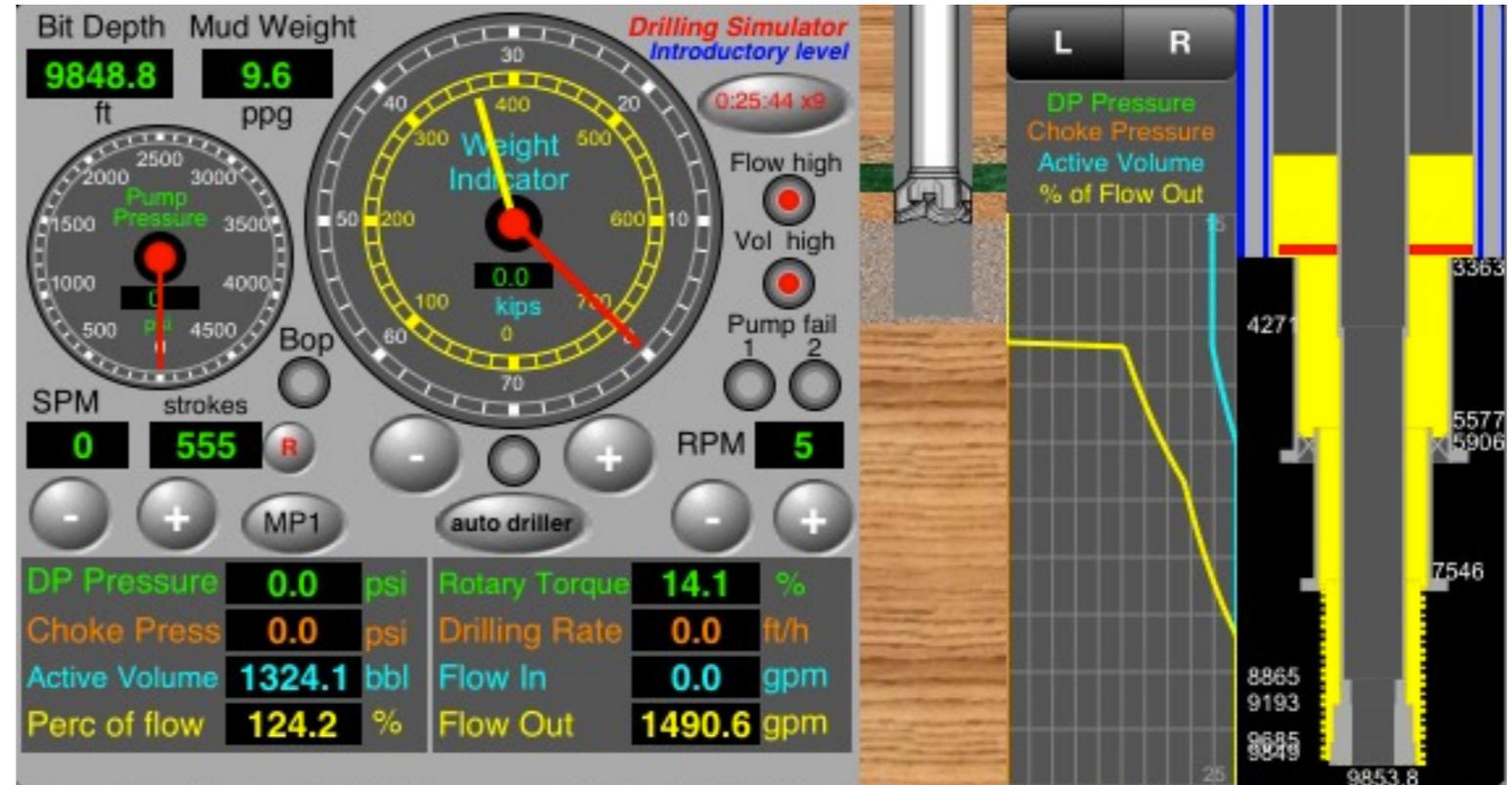
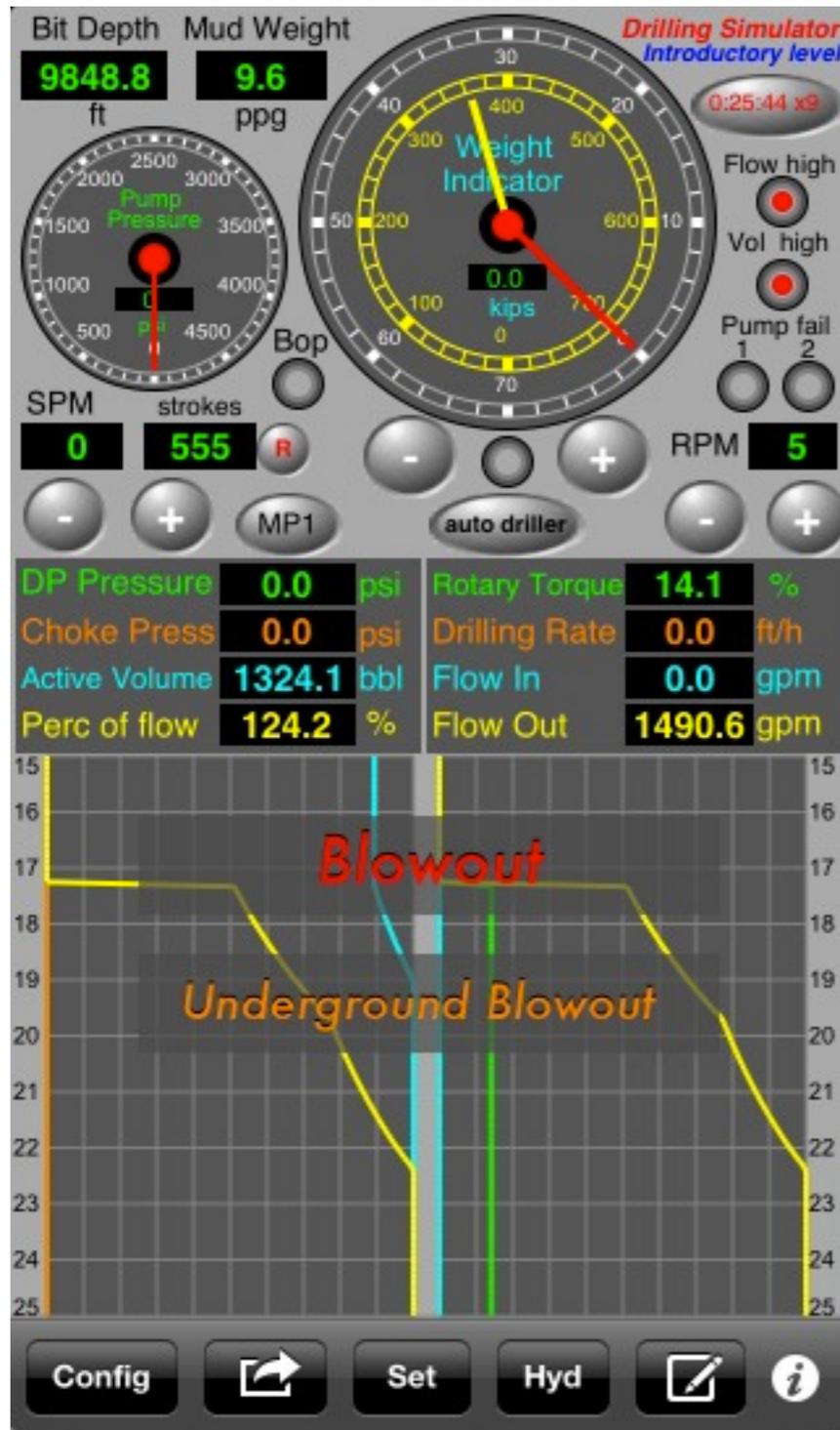
Same if RPM = 0 again, the failure on the BOP remains.



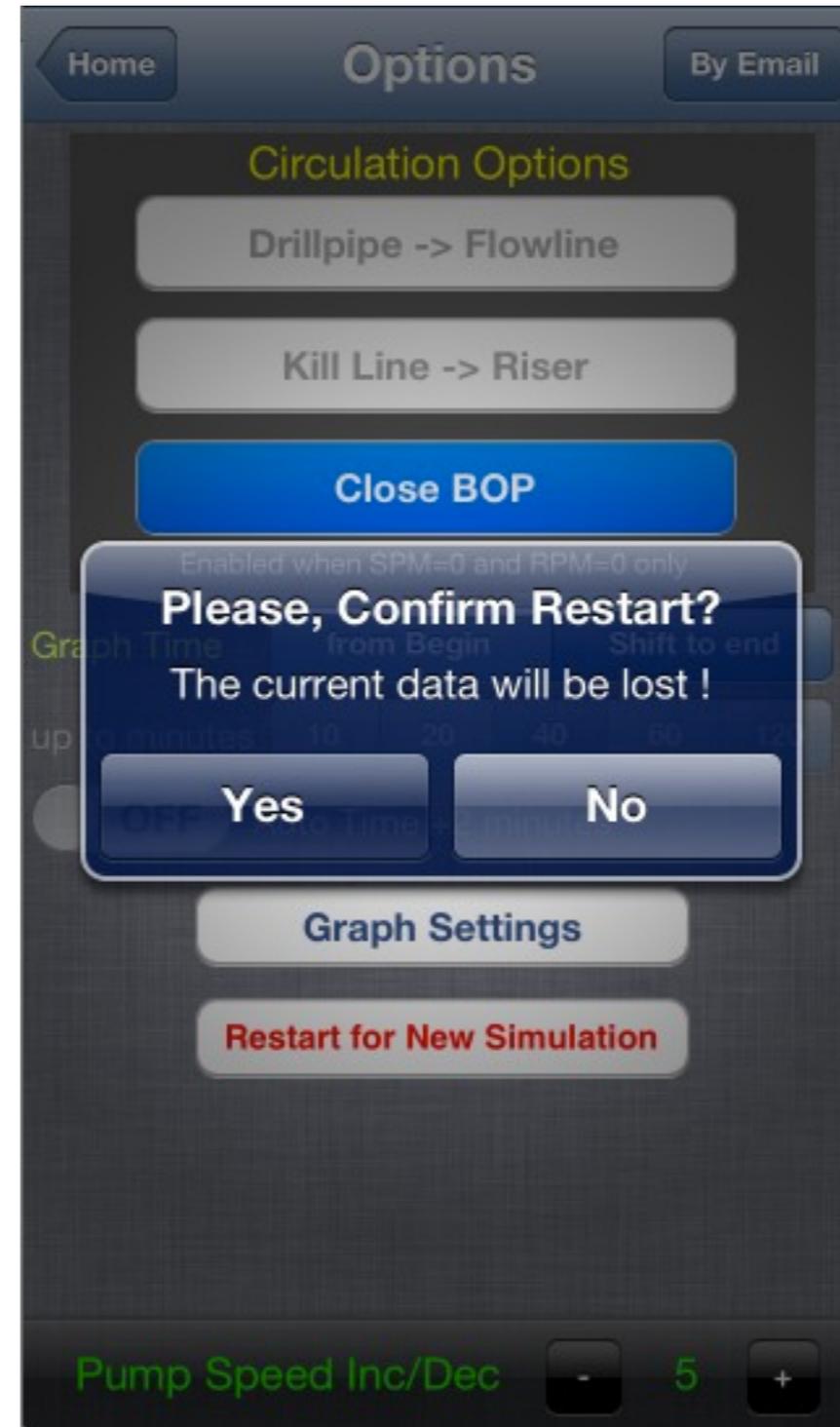
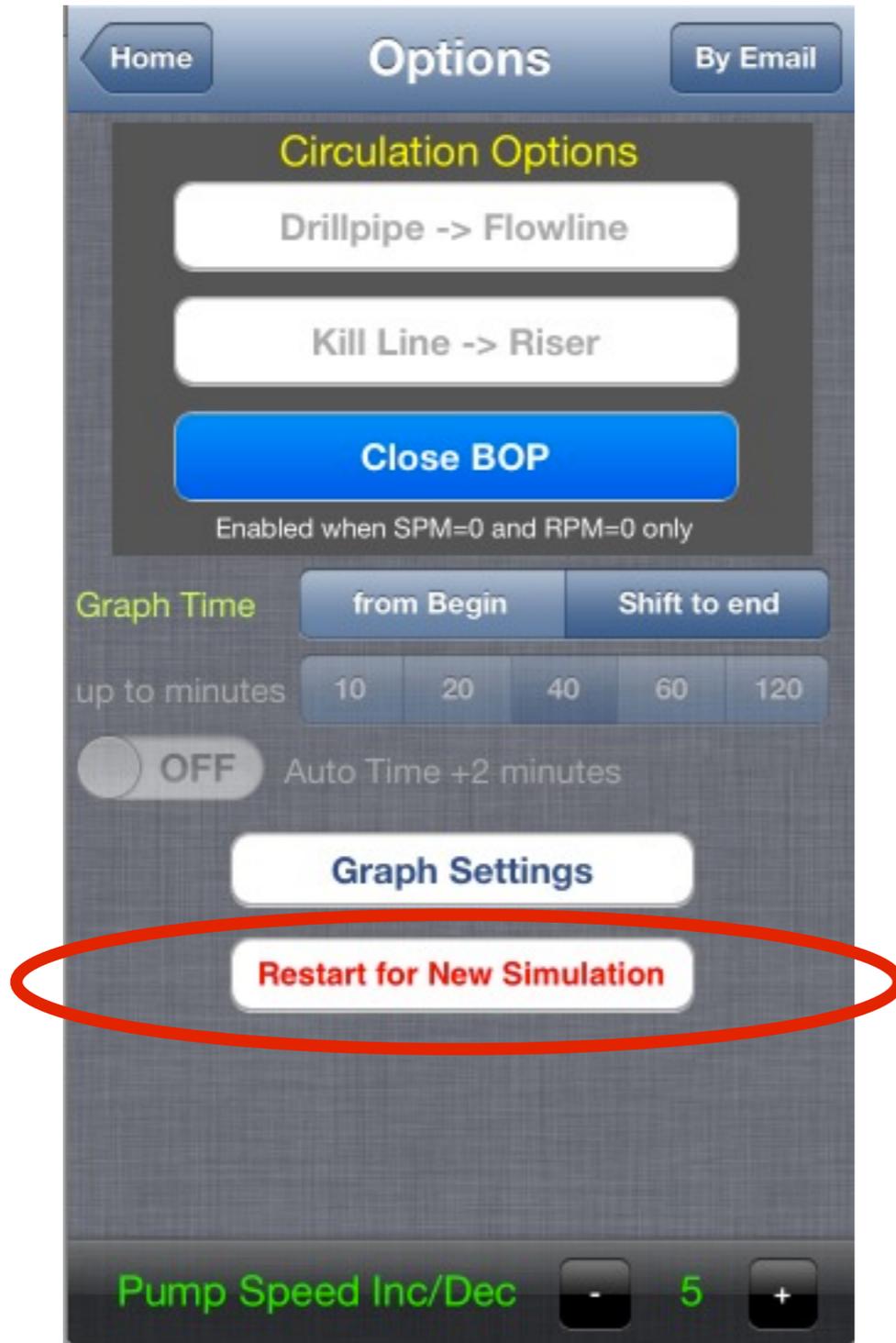
Reset failure

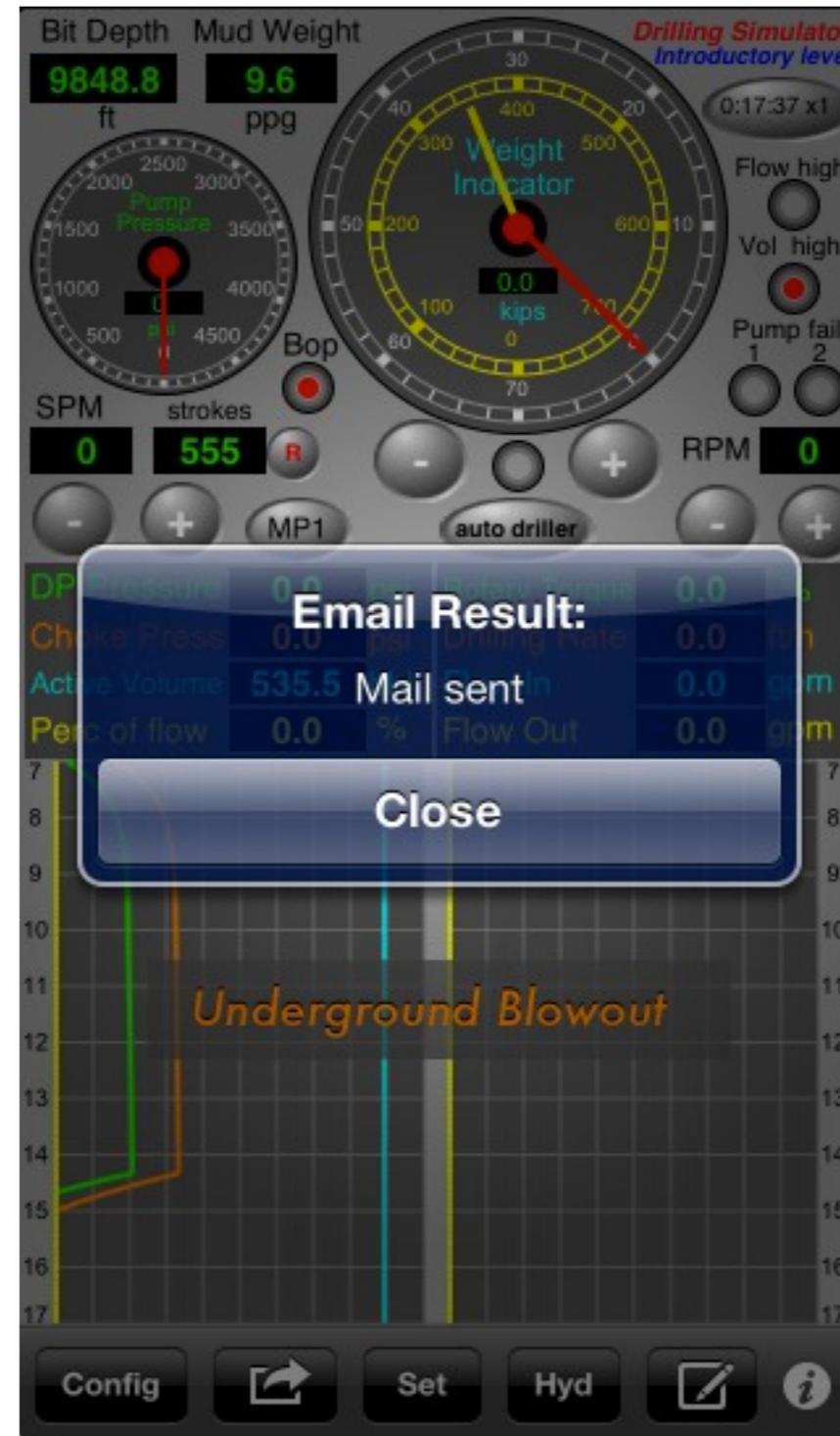
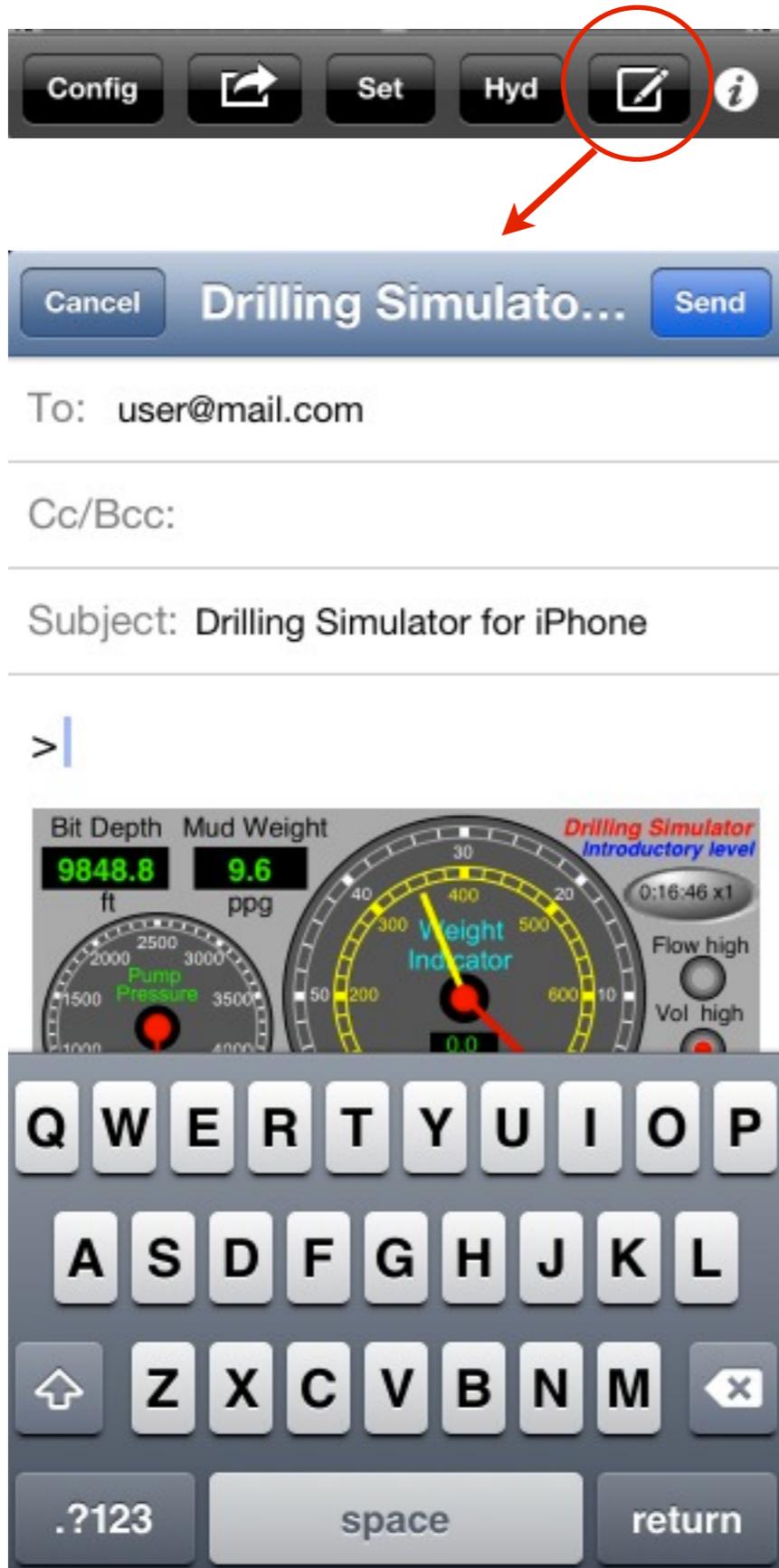


When the gas reach to BOP, shows the expression “Blowout” flashing in the graph.



In blowout, when the Gas reach on surface, the simulation end. Tap on “Restart for New Simulation” button in “Options” view





This app was developed based on my experience.

There was no comparison with any other software.

Our goal was to create a low-cost application with the help of experts to share with drilling engineers, technicians, drillers and students.

You can contribute with suggestions for improvements, correcting the translation to english, reporting bugs and spreading it to your friends.

Please visit our support url and see other applications for Oil & Gas for iPhone, iPod Touch, iPad and Mac OS X.

Contact:  
[contact@wellcontrol.com.br](mailto:contact@wellcontrol.com.br)

Support URL:  
<http://www.wellcontrol.com.br>

On App Store:  
[Oil & Gas Apps for iPhone and iPad](#)

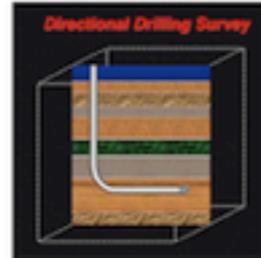


Applications
Well Control Methods
Drilling Hydraulics
Kick Tolerance
Drilling Cost
Directional Survey
Drilling Simulator
Others

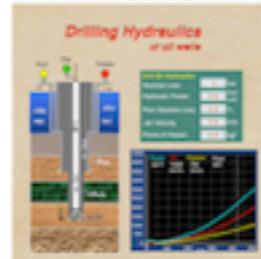
Knowledge
Methods and Concepts

Highlights
------------

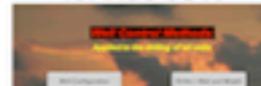
### Directional Drilling for Mac OS X



### Drilling Hydraulics for Mac OS X



### Well Control Methods for Mac OS X



### A Message to Our Customers

Our app suite sales are impressing us by each day, with satisfied customers buying a product for several devices, trying new ones, recommending to their co-workers and college friends, giving feedback with compliments and suggesting improvements.

We work hard to always bring to you the best experience.

Thank you very much, and welcome!



Enjoy our Apps!

### About Us

We are a team of specialists in petroleum engineering with over **24 years of expertise** in oil wells drilling and workover operations. We have in our portfolio **Well Control Simulators** for training and Monitoring Systems for the oil industry.

Our **mission** is to bring petroleum specialists and students **innovative tools** which will provide **safety** and **efficiency** to their work.



### News

>> Update for Well Control Methods for iPad 2.4 now available on the App Store

>> Directional Drilling Survey for iPhone, iPod Touch and iPad 2.2 now available on the App Store

>> Directional Drilling Survey for iPad: Single Well Survey (User Guide)

>> Directional Drilling Survey for iPad: Well Planning (User Guide)

>> Directional Drilling Survey for iPad: Load/Save Data File (User Guide)

>> Directional Drilling Survey 2.1 now available on the App Store: Sharing data files with iCloud

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Receive our Newsletter

### Well Control Apps for iPhone, iPod Touch, iPad and Mac OS X



iPhone Apps Video

