



#### Well Planning, engineering, and well services executable programs catalogue

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Page 1 <u>www.kingdomdrilling.co.uk</u>

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#### **Table of contents**

WELL PLANNING, ENGINEERING, AND WELL SERVICES EXECUTABLE PROGRAMS CATALOGUE	1
Table of contents	2
Disclaimer	3
P1. General programs	4
W2 Well Planning and Drilling Engineering	5
W3 Completions and well services	. 10

Ref: C01.1



#### **Disclaimer**

#### **General Safety Standards**

This documents figures, table's text or calculations, do not represent any specific safety standard, nor regulation, and create no new or otherwise legal obligations.

Their intent is to serve only as an well planning, design, construction and drilling or well operations advisory guides, where all informational contained in content is intended to assist employers and employees in providing a safe, healthful and environmentally complaint workplace, or through effective prevention assurance programs adapted to the needs of each place of employment tools, equipment, practices and procedures used.

Health Acts will exist in each specific operating region, location and/or environment and will require employers and employees to comply with hazard-specific safety and health standards. In addition, employers must provide their employees with a workplace free from recognized hazards likely to cause equipment failure malfunction, injury, serious loss or physical harm.

Employers can also often be cited for violating statutory rules and regulations if there is a recognized hazard that they then do not take steps to prevent or abate the hazard. However, failure to implement such guidelines is not, in itself, a violation.

#### **Oil and Gas Industry Disclaimer**

Although the document was developed from recognized and credible sources, it is not to be construed as an industry consensus standard as indicated in the following disclaimer.

"Nothing contained herein shall be construed to establish an industry-accepted standard of well design, construction, drilling or energy servicing safe operating procedures.

No suggested method, practice, precaution or program set forth in this guide should be relied upon to establish a legal standard of conduct or a legal duty, the violation of which would constitute culpability of any degree in any legal proceeding.

Information and/or data provided is for informational assistance only and should not be utilized or considered as a comprehensive safety and health program or accepted industry standard.

#### Kingdom Drilling Services Ltd, August 2009



#### P1. General programs

Table 1: General programs

Cat No	File Description	Size Type	
P1.1	SPE Symbols Standard document. This document outlines the standards as recommended by the Society of Petroleum Engineers, for oilfield calculations.         Society of Petroleum Engineers Symbols Committee 1993       1         SPE Symbols Standard       2         Objectives       2         Structure of Lists       2         Additional Standard Symbols       2         Principles of Symbols Stelection       2         Principles of Computer Symbol Standardization       2         Principles of Computer Symbol Standardization       3         Distinctions Between and Descriptions of Abbreviations, Computer Symbols, Unit Abbreviations, and Units       5         Contrasting Symbol Usage       6         Acknowledgments       6         Appendix       7         Basic Symbols in Alphabetical Order       15         Symbols in Alphabetical Order       34         Subscript Definitions in Alphabetical Order       34         Subscript Definitions in Alphabetical Order       34         Subscript Symbols in Alphabetical Order       34         Subscript Symbols in Alphabetical Order       34         Subscript Definitions in Alphabetical Order       34         Subscript Symbols in Alphabetical Order       34         Subscript Symbols in Alphabetical Order       34		
P1.2	Convert program: Allows user to convert from and to most units used in oil field calculations.         Convert       Convert         File Options Help       Distance Energy Flow Force Light Mass Power Pressure Speed Temperature Time Torque Volume Volume Ory Acceleration Angle Area Computer Concentration Custom Density         Input       Output         centimeter/sec2 (cm/s2)       Foot/sec2 (ft/s2)         mile/hour second (mi/[h:s])       mile/hour second (mi/[h:s])         mile/hour second (mi/[h:s])       mile/hour second (mi/[h:s])         Input:       1       centimeter/sec2 (cm/s2)         Input:       1       centimeter/sec2 (cm/s2)	568kb Program	



# W2 Well Planning and Drilling Engineering Table 2: Well planning and drilling engineering executable programs & calculations

Cat No	File Description			
P2.1	<b>44 Daily Drilling and work-over calculations program</b> . Examples as illustrated         BASIC FORMULAS         Maximum Mud Weight from Leak-off Test Data			
	Mud Weight ppg CALCULATE CLEAR Maximum Mud Weight ppg	<ul> <li>Hydrostatic Pess. Decrease</li> <li>Overbalance Loss</li> <li>Formation Temp.</li> <li>Drill Pipe/Collar Calculation</li> <li>Hydraulic HP</li> <li>Pressure/Stroke Relationship</li> <li>Cost per Foot</li> </ul>		
P2.2	Drilling Fluid design. Illustrated evalual programs.	Y		



P2.3	Mud doctor. A series of executable prog	etc.	550kb <b>Program</b>		
			ud	6	Frogram
	A		Inc/Dec Mud	Hydrocyclone	
		-	SG Barite	Mud Properties	
	Mu and Mu	d	Centri	ifuge	
	Doc		lydraulics —		
			-	Planning	
	(c) Dob	hunoff		o Rate Test	
		byson	Bit Hydraulics	Optimization	
				HP	
	Hello, I am a mud doctor I will serve you to calculate the mud calculation, and also	the hydraulics		HI V	
	I am also part of 'DEXS ver 2.0 ' software, Choose and click the button at the right for what you nee			lozzle	
	Thank you for using this software.		-		
P2.4	<b>Directional drilling</b> . Suite of quick loc calculations. One example of the five options			g	877kb <b>Progra</b> m
	calculations. One example of the live options				_
		BUR #1 2	deg	g/100 ft	
		BUR #2 2		g/100 ft	
	47	K00			
		KOP <u>1600</u>		feet	
		T			
		Target		feet	
		TVD 9650			
		North 1877	.369	feet	
		East 1877	.369	feet	
			1	1	
	Build - Hold - Drop	<u>C</u> alculate	Qui	t	











P2.10 Sentry 7 well test system executable program illustrating how the 673kb components of a subsea test string 'Sentree 7' works and operates. System E е Well intervention Products Controls Products Play 🕨 Components of the SenTREE7. Well intervention Sequences of the standard operation. Full disconnect in 15 secondes. O Play 🕨 Fishing procedure. Controls Controls of the SenTREE7 Play 🕨 Controls of the Deepsea Multiplex System



# W3 Completions and well services Table 3: Useful well services and completions engineering set of programmable calculations

Cat No	File Description	Size Type		
P3.1	P3.1 Scale. Scale prediction executable program using two industry established meth			
	Input Data			
	Water Analysis Data			
	Na+ 7599 mg/L O Oddo and Tomson Methode			
	Ca++ 877 mg/L			
	Mg++ 239 mg/L Close Close			
	Cl- 12294 mg/L Prediction CaCO3 Scale			
	CO3= 0 mg/L			
	HC03- 556 mg/L Saturation Index (SI)			
	S04-         1740         mg/L         Amount Scale (PTB)         lb/1000 bbl			
	Temperature 60 deg C			
	pH 7.04			
P3.2	multilateral well based on data as input.	770kb		
	Rock Properties Calculation Kh. m0 11 Prod Index			
	Kv. nD 4 1 Princion			
	• 0.2 0.1 0.2 Ped			
	h, H 305 170 100 Pixes elevation			
	5G of 0.71 0.71 0.71			
	Viscosity, dP 0.667 0.667 0.667 0.667			
	Ba, R8/518 1.251 1.251 1.251 Minimum Bale			
	Pr. pai 3700 3700 3700 P janolion Planolion Pb. pai 1500 1500 1500 Pud			
	Welbore Geometry below Juction Ploss elevation Lateral, It 1000 Toto 1000 Ploss techon			
	Build section, If [750 410 1150 0 minimum			
	Vietikal Depth, H [250 ]150 [50 Q total minimum			
	Well demoter; in 4.5 4.5 4.5 Miserum Bate			
	Roughness in 0.2 0.2 0.2 P procision			
	Oranage Area Area, acres 100 110 110 Pace elevation			
	(* Di, SPD			
	Paraction, psi 0 Base Eat O maximum			

#### www.kingdomdrilling.co.uk **Page** 10



P3.3	Gas-lift design software. War offer. This is a simply executab		design with several options on	477kb
	File Options Data Input IPR/Sensitivity (	Gas Lift Design		
	-Fluid Data		Gas Lift Data	
	Gas Deviation Factor	bu Kassem 💽	Poetmann and Carpenter	
	Gas Viscosity Dean-Steal	•	Unloading Procedure	
	Gas Solution Standing	•	Balanced Valve     Unbalanced Valve	
	C Bubble Point Pressure Standing	•	Mandreal	
	Oil Viscosity Beggs-Robi	nson+Vasques-Begg 💌	C Fix Mandreal	
	Oil Volume Factor Glasso	<b>.</b>	Unitx Nandreal	
	Oil Density Katz+Vasques-Beegs  Casing Operated Valve			
	-IPR -Pro	oduktivity Index	Existing Mandreal	
	Vogel 💌	<ul> <li>Reservoir Data</li> <li>Production Test</li> </ul>	Creste / Eoit	
		NEXT		
P3.4	Water injection. Program	n to determine water ir	ijection.	464kb
	File Option Help			
	I see a	₩ell #1 Data		
	Qi total  42500 BWPD SG water 1.001		Well No.	
	Viscosity 1.125 cp	Segment 1 (Horizontal Pipe)	Segment 3 (Wellbore-Open Hole)	
	Number of Injection well	Pipe ID 6.065 in	Well Diameter 3.25 in	
		Pipe Length 4686 ft	Length 820 ft	
		Roughness 0.004 in	Deviation 0 deg	
		Segment 2 (Wellbore-Cased) Roughness 0.0006 in	Number of Layer(s) 11 🚖	
	Calculate	Tubing ID 4 in	Laye         P         Inj.         Depth         ▲           1         2437         2         4729	
		Length 4720 ft	2 2461 1 4809	
		Deviation 0 deg	3 2486 2 4889 4 2516 9 4989 -	
	Result			
	Well#1 Depth Rate BHIP		P disc 2987 Psi	
	Layer#1         4729         2025         3450           Layer#2         4809         828         3289		HHP 2160 HP	
	Layer#3 4889 1674 3323			
	Layer#4         4989         7655         3367           Layer#5         5049         6032         3336           Layer#6         5169         5258         3447		Ţ. Close	



P3.5	Hydrocarbon phase	behaviours: as illustrated.		247kb <b>Program</b>
	 Pilihlah Parameter !!!			
	INPUT		OUTPUT	
	Z-Factor	Dranchuk- Abu Kassem 🗨	0.857	
	🔲 Gas Viscosity	Dean-Steal		
	🔲 Solution Gas (Rs)	Standing		
	Bubble Point Pressure (Pb)	Standing		
	🔲 Oil Viscosity	Beggs-Robinsson & Vasquez-Beggs 📃 👤		
	Formation Volum Factor (Bo)	Glasso		
	🔲 Oil Density	Katz & Vasquez-Beggs		
	1. Gas Specific Gravity (SGg)	0.7		
	2. System Pressure	1000 Psia		
	3. System Temperature	120 7. N2 Concentration	0.05 %	
		8. CO2 Concentration	0.5 %	
	KELUAR	9. H2S Concentration	0.002 %	
P3.6	Schlumberger Gas li	ft program example illustrating h	now a typical gas	733kb
		s utilising IPO Gas lift valves.	3.1	
	File View Control Help			
	GAS LIFT UNLOADIN	IG SEQUENCE	Schlumberge	n
	Mouse Click on the buttons Gas Lift Unloading Sequence	below to view the ce utilizing IPO Gas Lift Valves	oomaninor y	4
	Nijectian Ras	PRESSURE IN 100 PS	51 8 20 22 24 26	28
			.T.T.T.T.	
	Exercise La -			
	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1			
		$\square$		
	©		Begin Unloading QUI Sequence QUI	г

