PETROCALC

Useful Charts and Diagrams that are used by the student and professionals in the oil and gas field.

Charts & Diagrams

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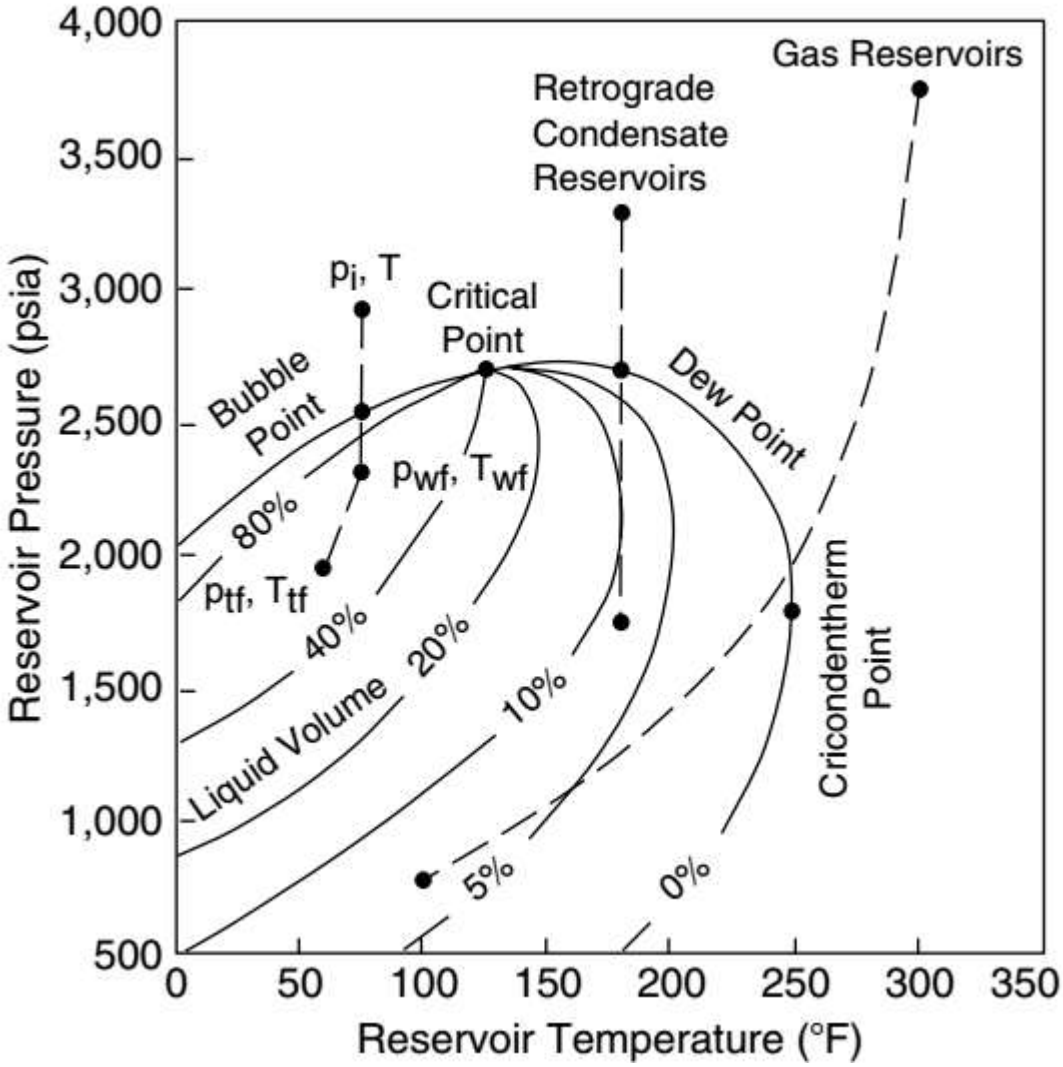

Figure 1 Hydrocarbon phase diagram (Guo, Lyons and Ghalambor 2007)

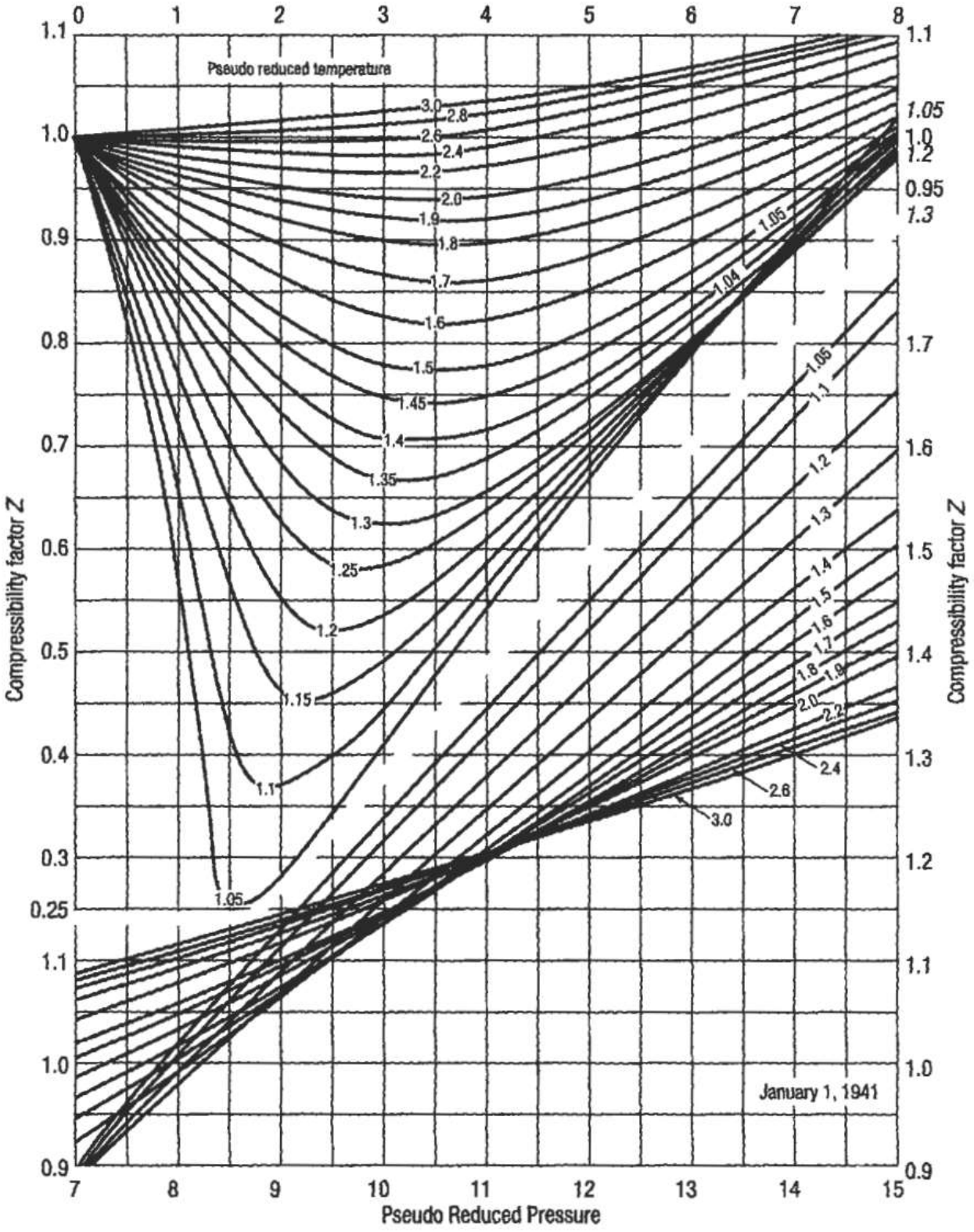

Figure 2 Z-Factor Chart (Lyons 1996)

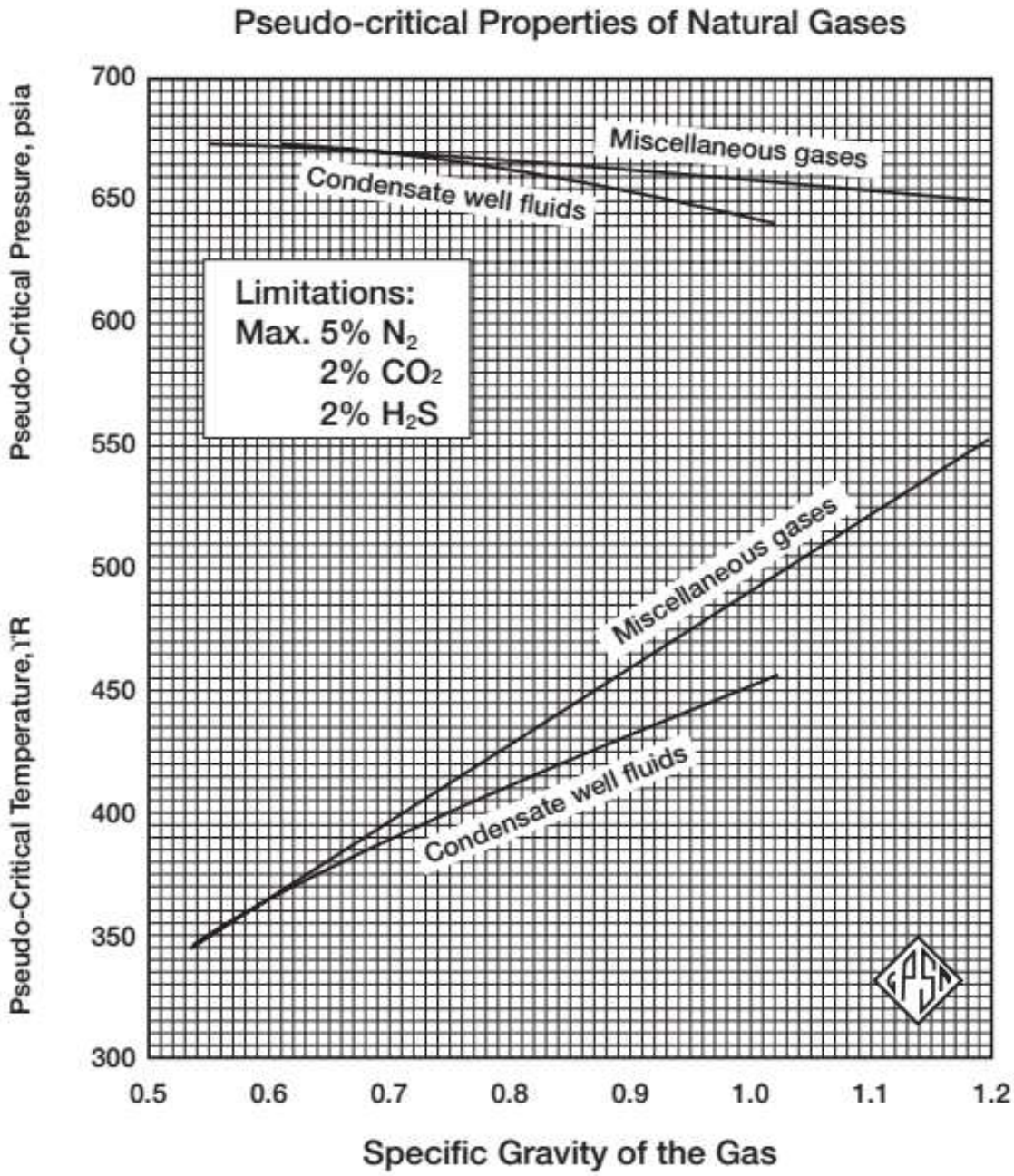

Figure 3 Pseudo-Critical Properties of Natural Gas (Ahmed 2001)

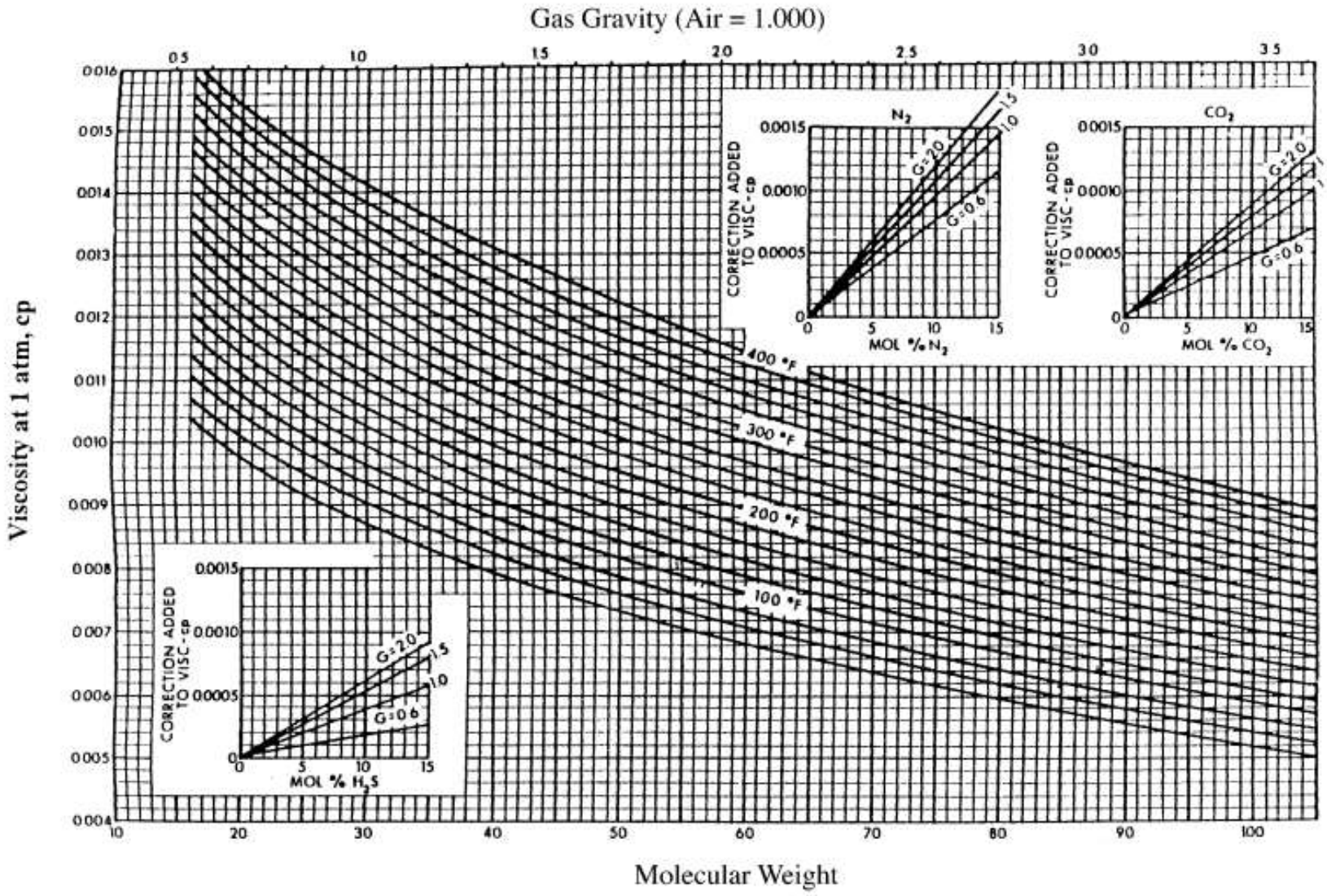

Figure 4 Carr's Gas Viscosity Correlation (Ahmed 2001)

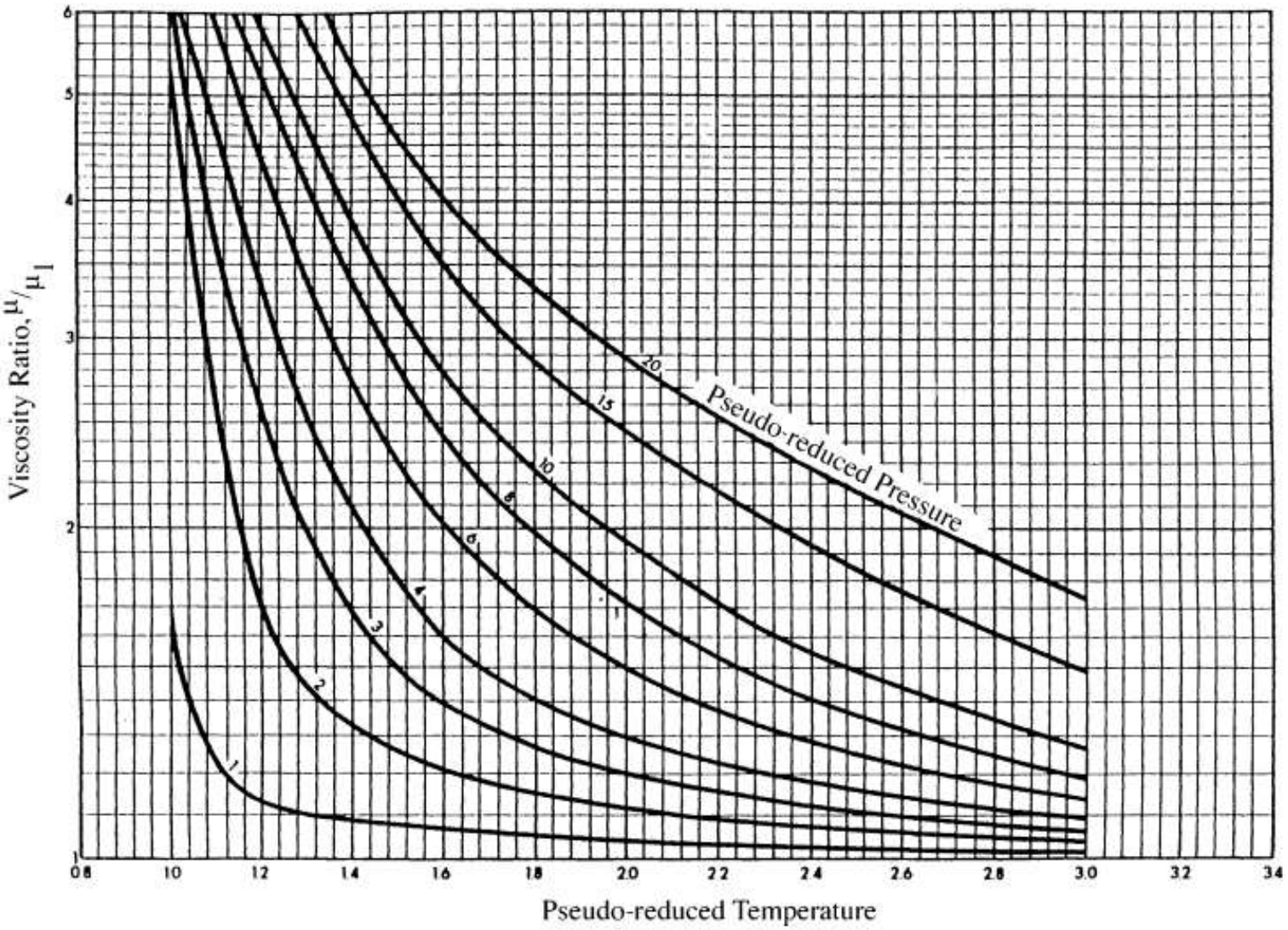

Figure 5 Carr's Viscosity Ratio Correlation (Ahmed 2001)

2. IOR

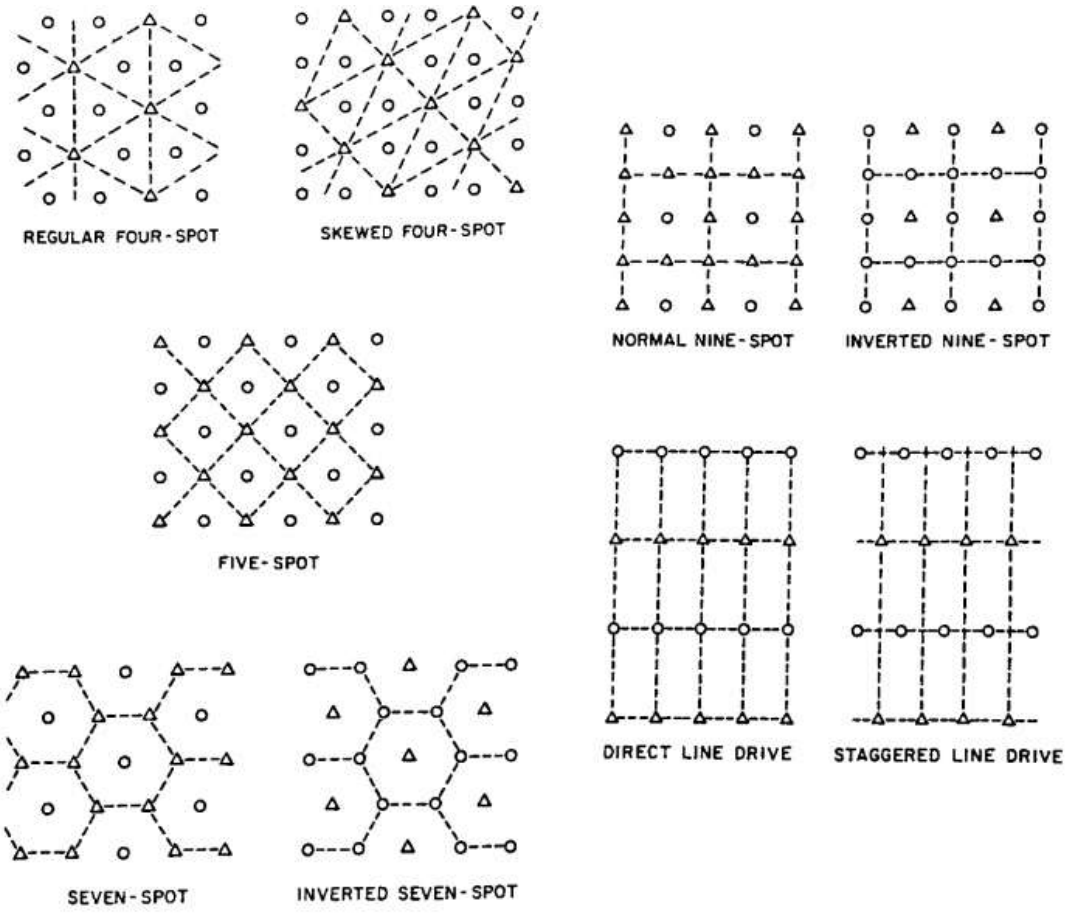

Figure 6 Water Flood patterns (Ahmed 2001)

	Oil properties			Reservoir characteristics					
	Gravity °API	Viscosity cp	Composition	Oil Saturation	Formation Type	Net thickness ft	Average permeability md	Depth ft	Temperature °F
Gas Injection methods									
Hydrocarbon	> 35	< 10	High % of C2 – C7	> 30% PV	Sandstone or carbonate	Thin unless dipping	N.C.	> 2,000 (LPG) to > 5,000 (H.P. Gas)	N.C.
Nitrogen & flue gas	> 24 > 35 for N_2	< 10	High % of C1 – C7	> 30% PV	Sandstone or carbonate	Thin unless dipping	N.C.	> 4,500	N.C.
Carbon dioxide	> 26	< 15	High % of C2 – C12	> 30% PV	Sandstone or carbonate	Thin unless dipping	N.C.	> 2,000	N.C.
Chemical Flooding									
Surfactant/polymer	> 25	< 30	Light intermediates desired	> 30% PV	Sandstone preferred	> 10	> 20	< 8,000	< 175
Polymer	> 25	< 150	N.C.	> 10% PV Mobile oil	Sandstone preferred; carbonate possible	N.C.	> 10 (normally)	< 9,000	< 200
Alkaline	13-35	< 200	Some organic acids	Above waterflood residual	Sandstone preferred	N.C.	> 20	< 9,000	< 200
Thermal									
Combustion	< 40 (10-25 normally)	< 1,000	Some asphaltic components	> 40-50% PV	Sand or sandstone with high porosity	> 10	> 100*	> 500	> 150 preferred
Steamflooding	< 25	> 20	N.C.	> 40-50% PV	Sand or sandstone with high porosity	> 20	> 200**	300-5,000	N.C.

From Reference 386.
N.C. = Not Critical
* Transmissibility > 20 md ft/cp
** Transmissibility > 100 md ft/cp

Figure 7 IOR Screening Criteria (Lyons 1996)

3. Formation Evaluation

Source	Relation	Notes
Archie [42]	$F_R = \phi^{-m}$	For consolidated sands, m= 1.8 to 2.5. For unconsolidated sands, m = 1.3.
Wyllie and Rose [43]	$F_R = \frac{\tau^{1/2}}{\phi}$	Tortuosity $\tau = L_e/L$
Tixier [44]	$F_R = \frac{1}{\phi^2}$	For limestone
Winsauer et al [45]	$F_R = \frac{\tau^2}{\phi}$	Theory
	$F_R = \frac{\tau^{1.87}}{\phi}$	Experimental (transport time of flowing ions)
	$F_R = 0.62\ \phi^{-2.15}$	Sandstones containing varying amounts of clay
Wyllie/Gregory [46]	$F_R = a\phi^{-m}$	General form of Archie relation
Cornell and Katz [47]	$F_R = \frac{L_e^2}{\phi L}$	F_R directly proportional to length and inversely proportional to area
Owen [48]	$F_R = 0.68\ \phi^{-2.23}$	Logs in dolomite, mud filtrate same resistivity as connate water
Hill and Milburn [49]	$F_R = 1.4\phi^{-1.78}$	Results of 450 sandstone and limestone cores with R_w of 0.01 ohm-m
	$F_R = \phi^{-1.93}$	When a = 1
Wyllie/Gardner [50]	$F_R = \frac{1}{\phi^2}$	Model of capillary bundle, for conducting wetting phase
Sweeney/Jennings [51]	$F_R = \phi^{-m}$	25 various carbonates
	m = 1.57	Water-wet
	m = 1.92	Intermediate wettability
	m = 2.01	Oil-wet
Carothers [52]	$F_R = 1.45\ \phi^{-1.54}$	Sandstones
	$F_R = 0.85\ \phi^{-2.14}$	Limestones
Porter/Carothers [53]	$F_R = 2.45\ \phi^{-1.08}$	From California logs
	$F_R = 1.97\ \phi^{-1.29}$	From Gulf Coast logs. All sandstones, S_w= 100%
Timur [54]	$F_R = 1.13\ \phi^{-1.73}$	Analysis of over 1,800 sandstone samples
Perez-Rosales [55]	$F_R = 1 + G(\phi^{-m} - 1)$	General theoretical relation
	$F_R = 1 + 1.03(\phi^{-1.73} - 1)$	Theoretical relation for sandstones

Figure 8 Formation Resistivity Factor and Porosity (Lyons 1996)

Type of test	Use of results
Capillary pressure	Defines irreducible fluid content, contacts.
Rock compressibility	Volume change caused by pressure change.
Permeability and porosity vs. pressure	Corrects to reservoir conditions.
Petrographic studies	
mineral	Used in log interpretation.
diagenesis	Origin of oil and source bed studies.
clay identification	Origin of oil and log analysis.
sieve analysis	Selection of screens, sand grain size.
Wettability	Used in capillary pressure interpretation and recovery analysis-relative permeability.
Electrical	
formation factor	Used in log interpretation.
resistivity index	
Acoustic velocity	Log and seismic interpretation.
Visual inspection	Rock description and geological study.
Thin sections, slabs	
Air, water, and other liquid permeability	Evaluates completion, workover, fracture and injection fluids; often combined with flood-pot test.
Flood-pot test and waterflood evaluation	Results in values for irreducible saturations, values for final recovery with special recovery fluids such as surfactants, water, and polymers.
Relative permeability	Relative permeability is used to obtain values
gas-oil	for effective permeability to each fluid when two
gas-water	or more fluids flow simultaneously; relative
water-oil	permeability enables the calculation of recovery
oil-special fluids	versus saturation and time while values from
thermal	flood-pot test give only end-point results.

Figure 9 Core Analysis (Lyons 1996)

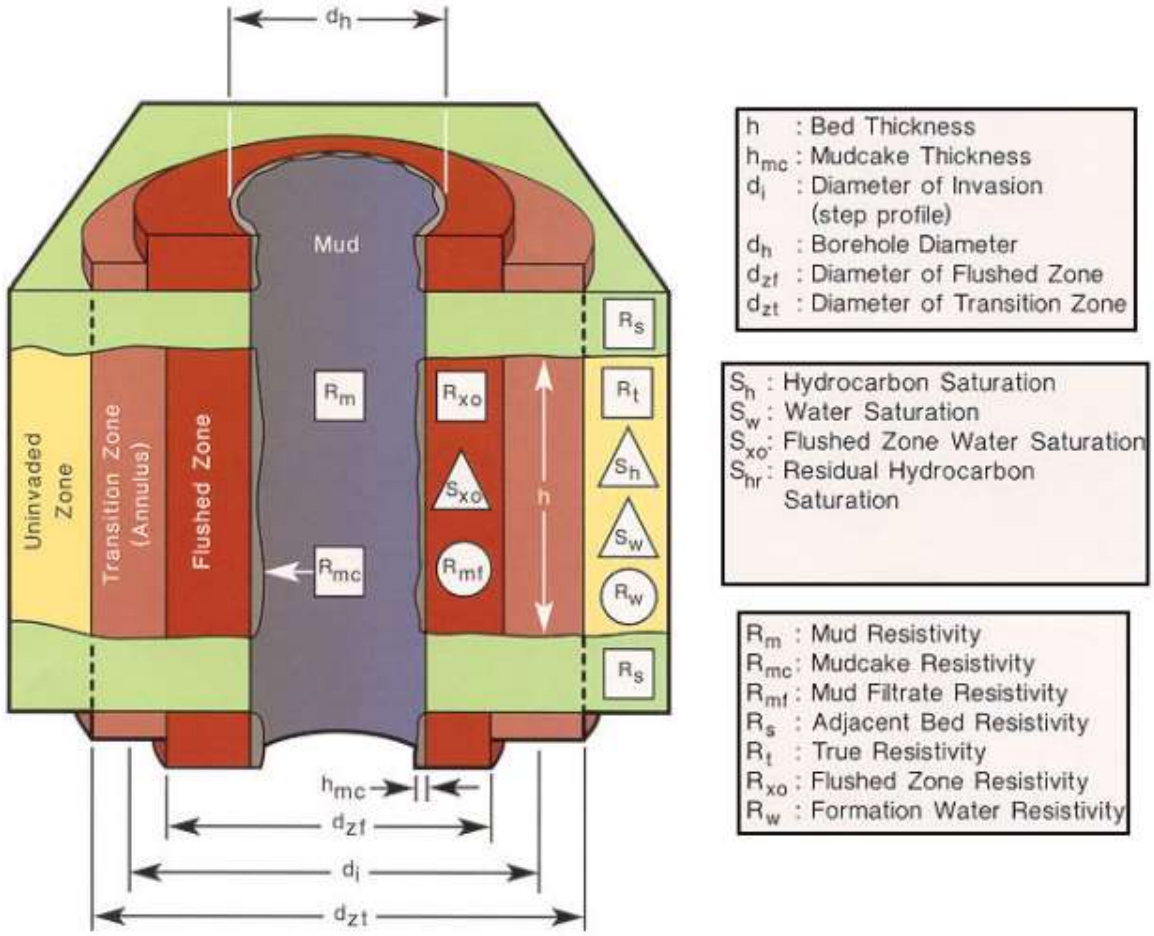

Figure 10 Borehole Environment (Halliburton 2001)

3.1. SP Interpretation

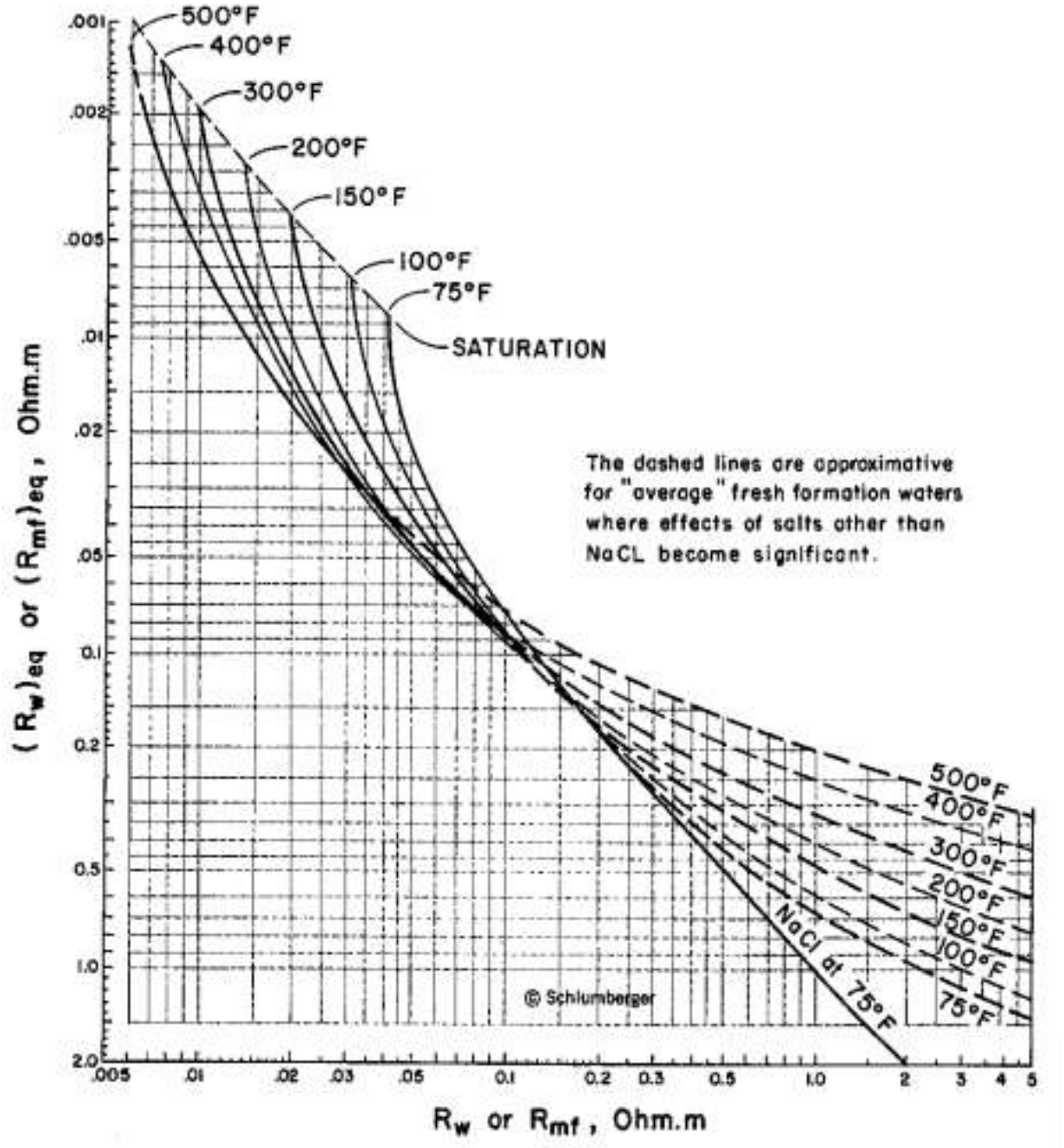

Figure 11 Chart for SP Interpretations (Bassiouni 1994)

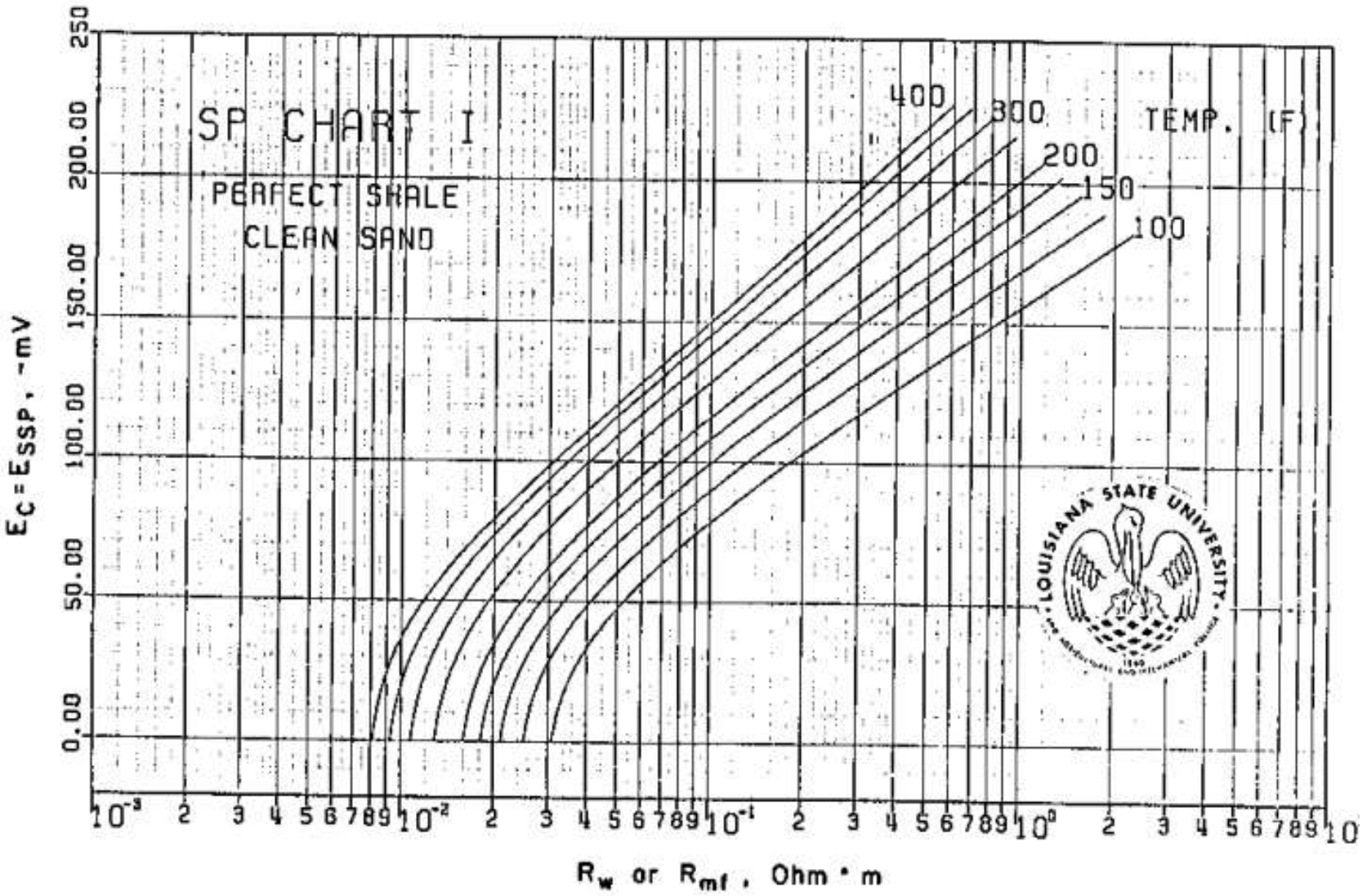

Figure 12 One Step SP Interpretation (Bassiouni 1994)

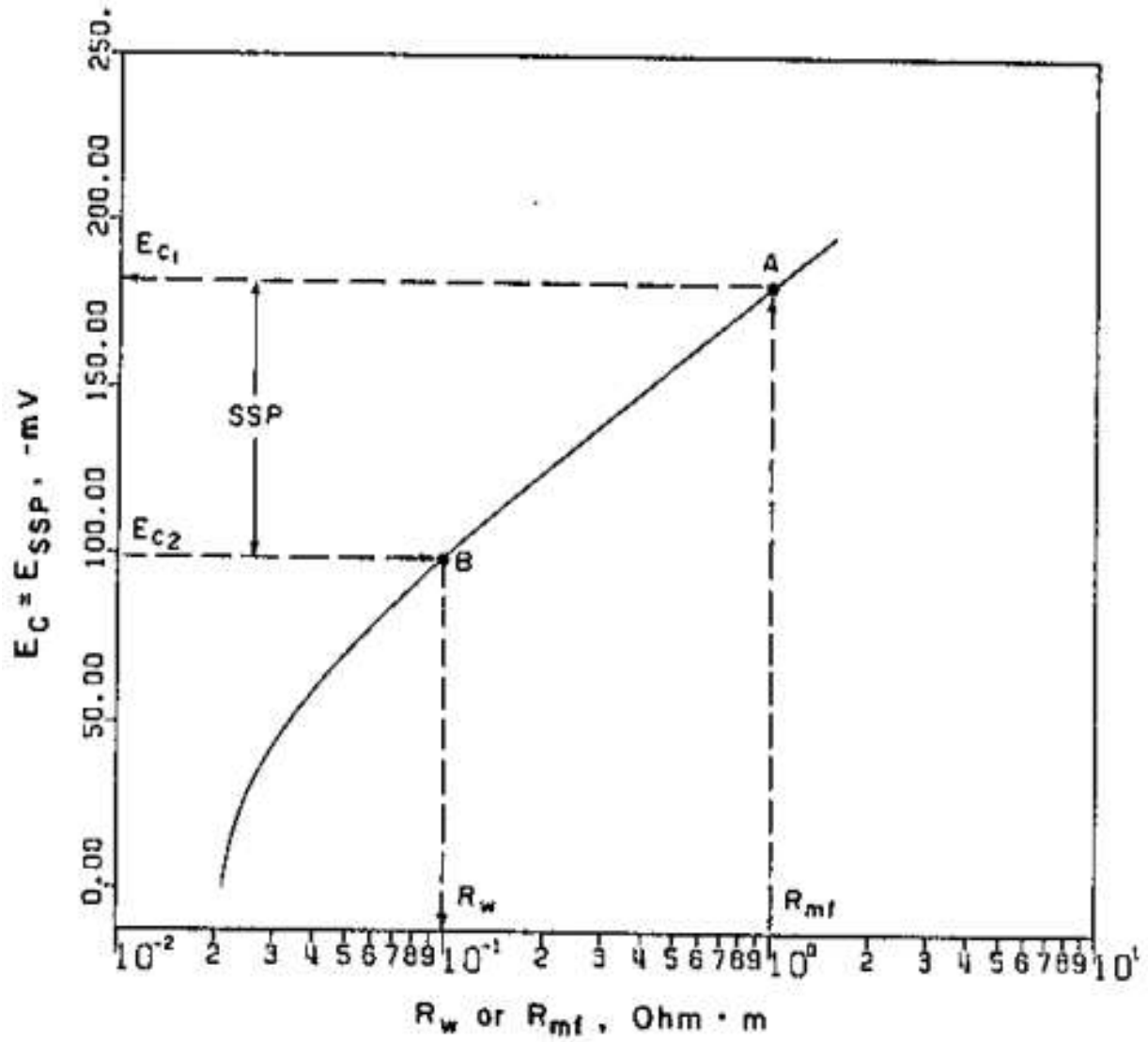

Figure 13 Another One Step Interpretation Chart (Bassiouni 1994)

4. Drilling & Completion

4.1. TFA

Nozzle size (x/32)	1 Nozzle	2 Nozzles	3 Nozzles	4 Nozzles	5 Nozzles	6 Nozzles	7 Nozzles	8 Nozzles	9 Nozzles
7	0.0376	0.0752	0.1127	0.1503	0.1879	0.2255	0.2631	0.3007	0.3382
8	0.0491	0.0982	0.1473	0.1963	0.2454	0.2945	0.3436	0.3927	0.4418
9	0.0621	0.1243	0.1864	0.2485	0.3106	0.3728	0.4349	0.4970	0.5591
10	0.0767	0.1534	0.2301	0.3068	0.3835	0.4602	0.5369	0.6136	0.6903
11	0.0928	0.1856	0.2784	0.3712	0.4640	0.5568	0.6496	0.7424	0.8353
12	0.1104	0.2209	0.3313	0.4418	0.5522	0.6627	0.7731	0.8836	0.9940
13	0.1296	0.2592	0.3889	0.5185	0.6481	0.7777	0.9073	1.0370	1.1666
14	0.1503	0.3007	0.4510	0.6013	0.7517	0.9020	1.0523	1.2026	1.3530
15	0.1726	0.3451	0.5177	0.6903	0.8629	1.0354	1.2080	1.3806	1.5532
16	0.1963	0.3927	0.5890	0.7854	0.9817	1.1781	1.3744	1.5708	1.7671
17	0.2217	0.4433	0.6650	0.8866	1.1083	1.3300	1.5516	1.7733	1.9949
18	0.2485	0.4970	0.7455	0.9940	1.2425	1.4910	1.7395	1.9880	2.2365
19	0.2769	0.5538	0.8307	1.1075	1.3844	1.6613	1.9382	2.2151	2.4920
20	0.3068	0.6136	0.9204	1.2272	1.5340	1.8408	2.1476	2.4544	2.7612
21	0.3382	0.6765	1.0147	1.3530	1.6912	2.0295	2.3677	2.7059	3.0442
22	0.3712	0.7424	1.1137	1.4849	1.8561	2.2273	2.5986	2.9698	3.3410
23	0.4057	0.8115	1.2172	1.6230	2.0287	2.4344	2.8402	3.2459	3.6516
24	0.4418	0.8836	1.3254	1.7671	2.2089	2.6507	3.0925	3.5343	3.9761
25	0.4794	0.9587	1.4381	1.9175	2.3968	2.8762	3.3556	3.8350	4.3143
26	0.5185	1.0370	1.5555	2.0739	2.5924	3.1109	3.6294	4.1479	4.6664
27	0.5591	1.1183	1.6774	2.2365	2.7957	3.3548	3.9140	4.4731	5.0322
28	0.6013	1.2026	1.8040	2.4053	3.0066	3.6079	4.2092	4.8106	5.4119
29	0.6450	1.2901	1.9351	2.5802	3.2252	3.8702	4.5153	5.1603	5.8054
30	0.6903	1.3806	2.0709	2.7612	3.4515	4.1417	4.8320	5.5223	6.2126

Table 1 Drill Bit Nozzle Flow Area

4.2. Drill Pipe Criteria

DIMENSIONAL ACCEPTANCE CRITERIA FOR USED DRILL PIPE TUBES								
1	2	3	4	5		6	7	
Nominal Size OD (in.)	Nominal Weight (lb/ft.)	Internal Diameter ID (in.)	Premium Class			Class 2		
			Minimum Remaining Wall (80%)	3% OD variation from nominal		Minimum Remaining Wall (70%)	4% OD variation from nominal	
				Max.	Min.		Max.	Min.
2 3/8	4.85	1.995	0.152	2.304	2.446	0.133	2.280	2.470
2 3/8	6.65	1.815	0.224	2.304	2.446	0.196	2.280	2.470
2 7/8	6.85	2.441	0.174	2.789	2.961	0.152	2.760	2.990
2 7/8	10.40	2.151	0.290	2.789	2.961	0.253	2.760	2.990
3 1/2	9.50	2.992	0.203	3.395	3.605	0.178	3.360	3.640
3 1/2	13.30	2.764	0.294	3.395	3.605	0.258	3.360	3.640
3 1/2	15.50	2.602	0.359	3.395	3.605	0.314	3.360	3.640
4	11.85	3.476	0.210	3.880	4.120	0.183	3.840	4.160
4	14.00	3.340	0.264	3.880	4.120	0.231	3.840	4.160
4	15.70	3.240	0.304	3.880	4.120	0.266	3.840	4.160
4 1/2	13.75	3.958	0.217	4.365	4.635	0.190	4.320	4.680
4 1/2	16.60	3.826	0.270	4.365	4.635	0.236	4.320	4.680
4 1/2	20.00	3.640	0.344	4.365	4.635	0.301	4.320	4.680
4 1/2	22.82	3.500	0.400	4.365	4.635	0.350	4.320	4.680
5	16.25	4.408	0.237	4.850	5.150	0.207	4.800	5.200
5	19.50	4.276	0.290	4.850	5.150	0.253	4.800	5.200
5	25.60	4.000	0.400	4.850	5.150	0.350	4.800	5.200
5 1/2	19.20	4.892	0.243	5.335	5.665	0.213	5.280	5.720
5 1/2	21.90	4.778	0.289	5.335	5.665	0.253	5.280	5.720
5 1/2	24.70	4.670	0.332	5.335	5.665	0.291	5.280	5.720
6 5/8	25.20	5.965	0.264	6.426	6.824	0.231	6.360	6.890
6 5/8	27.72	5.901	0.290	6.426	6.824	0.253	6.360	6.890

Table 2 Drill Pipe Criteria

4.3. Casing Tables

4.3.1. 4 ½” Casing Data

O.D. (inch)	Nominal Weight T & C lbs/ft	Grade	Collapse Pressure (psi)	Joint Strength 1000 lbs			Body Yield 1000 lbs	Wall (inch)	I.D. (inch)	Drift Diameter (inch)	Displacement (bbl/ft)	Capacity (bbl/ft)
				STC	LTC	BTC						
4 1/2	9.5	J-55	3310	101			152	0.205	4.09	3.965	0.00342	0.01625
4 1/2	9.5	K-55	3310	112			152	0.205	4.09	3.965	0.00342	0.01625
4 1/2	9.5	LS-65	3600	135			180	0.205	4.09	3.965	0.00342	0.01625
4 1/2	10.5	J-55	4010	132		203	166	0.224	4.052	3.927	0.00372	0.01595
4 1/2	10.5	K-55	4010	146		249	166	0.224	4.052	3.927	0.00372	0.01595
4 1/2	10.5	LS-65	4420	154		231	195	0.224	4	3.927	0.00413	0.01554
4 1/2	11.6	J-55	4960	154	162	225	184	0.25	4	3.875	0.00413	0.01554
4 1/2	11.6	K-55	4960	170	180	277	184	0.25	4	3.875	0.00413	0.01554
4 1/2	11.6	LS-65	5560	179	188	256	217	0.25	4	3.875	0.00413	0.01554
4 1/2	11.6	L-80	6350		212	291	267	0.25	4	3.875	0.00413	0.01554
4 1/2	11.6	HCL-80	8650		223	312	267	0.25	4	3.875	0.00413	0.01554
4 1/2	11.6	N-80	6350		223	304	267	0.25	4	3.875	0.00413	0.01554
4 1/2	11.6	HCN-80	8650		223	312	267	0.25	4	3.875	0.00413	0.01554
4 1/2	11.6	C-90	6810		223	309	300	0.25	4	3.875	0.00413	0.01554
4 1/2	11.6	S-95	8650		245	338	317	0.25	4	3.875	0.00413	0.01554
4 1/2	11.6	T-95	7030		234	325	317	0.25	4	3.875	0.00413	0.01554
4 1/2	11.6	C-95	7030		234	325	317	0.25	4	3.875	0.00413	0.01554
4 1/2	11.6	HCP-110	8650		279	385	367	0.25	4	3.875	0.00413	0.01554
4 1/2	11.6	P-110	7580		279	385	367	0.25	4	3.875	0.00413	0.01554
4 1/2	13.5	LS-65	7300		228	295	249	0.29	3.92	3.795	0.00474	0.01493
4 1/2	13.5	L-80	8540		257	334	307	0.29	3.92	3.795	0.00474	0.01493
4 1/2	13.5	HCL-80	10380		270	359	307	0.29	3.92	3.795	0.00474	0.01493
4 1/2	13.5	N-80	8540		270	349	307	0.29	3.92	3.795	0.00474	0.01493
4 1/2	13.5	HCN-80	10380		270	359	307	0.29	3.92	3.795	0.00474	0.01493
4 1/2	13.5	C-90	9300		270	355	345	0.29	3.92	3.795	0.00474	0.01493

4 1/2	13.5	S-95	10380		297	388	364	0.29	3.92	3.795	0.00474	0.01493
4 1/2	13.5	T-95	9660		284	374	364	0.29	3.92	3.795	0.00474	0.01493
4 1/2	13.5	C-95	9660		284	374	364	0.29	3.92	3.795	0.00474	0.01493
4 1/2	13.5	P-110	10680		338	443	422	0.29	3.92	3.795	0.00474	0.01493
4 1/2	15.1	L-80	11090		308	384	353	0.337	3.826	3.701	0.00545	0.01422
4 1/2	15.1	HCL-80	12330		325	408	353	0.337	3.826	3.701	0.00545	0.01422
4 1/2	15.1	S-95	12330		357	446	419	0.337	3.826	3.701	0.00545	0.01422
4 1/2	15.1	P-110	14350		406	509	485	0.337	3.826	3.701	0.00545	0.01422
4 1/2	15.1	Q-125	15840		438	554	551	0.337	3.826	3.701	0.00545	0.01422
4 1/2	15.1	LS-140	17240		487	616	617	0.337	3.826	3.701	0.00545	0.01422
4 1/2	15.1	V-150	18110		519	658	661	0.337	3.826	3.701	0.00545	0.01422

Table 3 41/2" Casing Data

4.3.2. 5" Casing Data

O.D. (inch)	Nominal Weight T & C lbs/ft	Grade	Collapse Pressure (psi)	Joint Strength 1000 lbs			Body Yield 1000 lbs	Wall (inch)	I.D. (inch)	Drift Diameter (inch)	Displacement (bbl/ft)	Capacity (bbl/ft)
				STC	LTC	BTC						
5	11.5	J-55	3060	133			182	0.22	4.56	4.435	0.00409	0.02020
5	11.5	K-55	3060	147			182	0.22	4.56	4.435	0.00409	0.02020
5	11.5	LS-65	3290	162			215	0.22	4.56	4.435	0.00409	0.02020
5	13	J-55	4140	169	182	252	208	0.253	4.494	4.369	0.00467	0.01962
5	13	K-55	4140	186	201	309	208	0.253	4.494	4.369	0.00467	0.01962
5	13	LS-65	4590	196	212	288	245	0.253	4.494	4.369	0.00467	0.01962
5	15	J-55	5560	207	223	293	241	0.296	4.408	4.283	0.00541	0.01888
5	15	K-55	5560	228	246	359	241	0.296	4.408	4.283	0.00541	0.01888
5	15	LS-65	6280	240	259	334	284	0.296	4.408	4.283	0.00541	0.01888
5	15	L-80	7250		295	379	350	0.296	4.408	4.283	0.00541	0.01888
5	15	HCL-	9380		311	408	350	0.296	4.408	4.283	0.00541	0.01888

		80										
5	15	N-80	7250		311	396	350	0.296	4.408	4.283	0.00541	0.01888
5	15	HCN-80	9380		311	408	350	0.296	4.408	4.283	0.00541	0.01888
5	15	C-90	7840		311	404	394	0.296	4.408	4.283	0.00541	0.01888
5	15	S-95	9380		342	441	416	0.296	4.408	4.283	0.00541	0.01888
5	15	T-95	8110		326	424	416	0.296	4.408	4.283	0.00541	0.01888
5	15	C-95	8110		326	424	416	0.296	4.408	4.283	0.00541	0.01888
5	15	P-110	8850		388	503	481	0.296	4.408	4.283	0.00541	0.01888
5	15	V-150	10250		497	651	656	0.296	4.408	4.283	0.00541	0.01888
5	18	LS-65	8730		331	403	343	0.362	4.276	4.151	0.00652	0.01776
5	18	L-80	10500		377	457	422	0.362	4.276	4.151	0.00652	0.01776
5	18	HCL-80	11880		396	492	422	0.362	4.276	4.151	0.00652	0.01776
5	18	N-80	10500		396	477	422	0.362	4.276	4.151	0.00652	0.01776
5	18	HCN-80	11880		396	492	422	0.362	4.276	4.151	0.00652	0.01776
5	18	C-90	11530		396	484	475	0.362	4.276	4.151	0.00652	0.01776
5	18	T-95	12030		416	512	501	0.362	4.276	4.151	0.00652	0.01776
5	18	C-95	12030		416	512	501	0.362	4.276	4.151	0.00652	0.01776
5	18	P-110	13470		495	606	580	0.362	4.276	4.151	0.00652	0.01776
5	18	Q-125	14830		535	661	659	0.362	4.276	4.151	0.00652	0.01776
5	18	LS-140	16080		594	735	738	0.362	4.276	4.151	0.00652	0.01776
5	18	V-150	16860		634	785	791	0.362	4.276	4.151	0.00652	0.01776
5	21.4	L-80	12760		466	510	501	0.437	4.126	4.001	0.00775	0.01654
5	21.4	N-80	12760		490	537	501	0.437	4.126	4.001	0.00775	0.01654
5	21.4	C-90	14360		490	537	564	0.437	4.126	4.001	0.00775	0.01654
5	21.4	T-95	15160		515	563	595	0.437	4.126	4.001	0.00775	0.01654
5	21.4	C-95	15160		515	563	595	0.437	4.126	4.001	0.00775	0.01654
5	21.4	P-110	17550		613	671	689	0.437	4.126	4.001	0.00775	0.01654
5	21.4	Q-125	19940		662	724	783	0.437	4.126	4.001	0.00775	0.01654
5	23.2	L-80	13830		513	510	543	0.478	4.044	3.919	0.00840	0.01589
5	23.2	HCL-80	15820		540	516	543	0.478	4.044	3.919	0.00840	0.01589

5	23.2	N-80	13830		540	537	543	0.478	4.044	3.919	0.00840	0.01589
5	23.2	HCN-80	15820		540	537	543	0.478	4.044	3.919	0.00840	0.01589
5	23.2	C-90	15560		540	537	611	0.478	4.044	3.919	0.00840	0.01589
5	23.2	S-95	16430		594	590	645	0.478	4.044	3.919	0.00840	0.01589
5	23.2	T-95	16430		567	563	645	0.478	4.044	3.919	0.00840	0.01589
5	23.2	C-95	16430		567	563	645	0.478	4.044	3.919	0.00840	0.01589
5	23.2	P-110	19020		675	671	747	0.478	4.044	3.919	0.00840	0.01589
5	23.2	Q-125	21620		729	724	849	0.478	4.044	3.919	0.00840	0.01589
5	24.1	L-80	14400		538	510	566	0.5	4	3.875	0.00874	0.01554
5	24.1	N-80	14400		558	537	566	0.5	4	3.875	0.00874	0.01554
5	24.1	C-90	16200		567	537	636	0.5	4	3.875	0.00874	0.01554
5	24.1	T-95	17100		595	563	672	0.5	4	3.875	0.00874	0.01554
5	24.1	C-95	17100		595	563	672	0.5	4	3.875	0.00874	0.01554
5	24.1	P-110	19800		708	671	778	0.5	4	3.875	0.00874	0.01554
5	24.1	Q-125	22500		765	724	884	0.5	4	3.875	0.00874	0.01554
5	24.1	V-150	27000		907	858	1060	0.5	4	3.875	0.00874	0.01554

Table 4 5" Casing Data

4.3.3. 5 ½" Casing Data

O.D. (inch)	Nominal Weight T & C lbs/ft	Grade	Collapse Pressure (psi)	Joint Strength 1000 lbs			Body Yield 1000 lbs	Wall (inch)	I.D. (inch)	Drift Diameter (inch)	Displacement (bbl/ft)	Capacity (bbl/ft)
				STC	LTC	BTC						
5 1/2	15.5	J-55	4040	202	217	300	248	0.275	4.95	4.825	0.00558	0.02380
5 1/2	15.5	K-55	4040	222	239	366	248	0.275	4.95	4.825	0.00558	0.02380
5 1/2	15.5	LS-65	4470	235	253	342	293	0.275	4.95	4.825	0.00558	0.02380
5 1/2	17	J-55	4910	229	247	329	273	0.304	4.892	4.767	0.00614	0.02325
5 1/2	17	K-55	4910	252	272	402	273	0.304	4.892	4.767	0.00614	0.02325
5 1/2	17	LS-65	5510	267	287	376	323	0.304	4.892	4.767	0.00614	0.02325
5 1/2	17	L-80	6390		338	428	397	0.304	4.892	4.767	0.00614	0.02325
5 1/2	17	HCL-80	8580		356	462	397	0.304	4.892	4.767	0.00614	0.02325
5 1/2	17	N-80	6390		348	446	397	0.304	4.892	4.767	0.00614	0.02325
5 1/2	17	HCN-80	8580		356	462	397	0.304	4.892	4.767	0.00614	0.02325
5 1/2	17	C-90	6740		356	456	447	0.304	4.892	4.767	0.00614	0.02325
5 1/2	17	S-95	8580		392	498	471	0.304	4.892	4.767	0.00614	0.02325
5 1/2	17	T-95	6940		374	480	471	0.304	4.892	4.767	0.00614	0.02325
5 1/2	17	C-95	6940		374	480	471	0.304	4.892	4.767	0.00614	0.02325
5 1/2	17	HCP-110	8580		445	568	546	0.304	4.892	4.767	0.00614	0.02325
5 1/2	17	P-110	7480		445	568	546	0.304	4.892	4.767	0.00614	0.02325
5 1/2	17	HCQ-125	8580		481	620	620	0.304	4.892	4.767	0.00614	0.02325
5 1/2	17	Q-125	7890		481	620	620	0.304	4.892	4.767	0.00614	0.02325
5 1/2	17	LS-140	8580		534	690	695	0.304	4.892	4.767	0.00614	0.02325
5 1/2	20	LS-65	7540		353	442	379	0.361	4.778	4.653	0.00721	0.02218
5 1/2	20	L-80	8830		416	503	466	0.361	4.778	4.653	0.00721	0.02218
5 1/2	20	HCL-80	10630		438	542	466	0.361	4.778	4.653	0.00721	0.02218
5 1/2	20	N-80	8830		428	524	466	0.361	4.778	4.653	0.00721	0.02218
5 1/2	20	HCN-80	10630		438	542	466	0.361	4.778	4.653	0.00721	0.02218
5 1/2	20	C-90	9630		438	436	525	0.361	4.778	4.653	0.00721	0.02218
5 1/2	20	S-95	10630		482	585	554	0.361	4.778	4.653	0.00721	0.02218

5 1/2	20	T-95	10010		460	563	554	0.361	4.778	4.653	0.00721	0.02218
5 1/2	20	C-95	10010		460	563	554	0.361	4.778	4.653	0.00721	0.02218
5 1/2	20	P-110	11100		548	667	641	0.361	4.778	4.653	0.00721	0.02218
5 1/2	20	Q-125	12080		592	728	729	0.361	4.778	4.653	0.00721	0.02218
5 1/2	20	LS-140	12950		657	810	816	0.361	4.778	4.653	0.00721	0.02218
5 1/2	20	V-150	13460		701	865	874	0.361	4.778	4.653	0.00721	0.02218
5 1/2	23	L-80	11160		489	550	530	0.415	4.67	4.545	0.00820	0.02119
5 1/2	23	N-80	11160		502	579	530	0.415	4.67	4.545	0.00820	0.02119
5 1/2	23	HCN-80	12450		514	579	530	0.415	4.67	4.545	0.00820	0.02119
5 1/2	23	C-90	12380		514	579	597	0.415	4.67	4.545	0.00820	0.02119
5 1/2	23	S-95	12940		566	637	630	0.415	4.67	4.545	0.00820	0.02119
5 1/2	23	T-95	12940		540	608	630	0.415	4.67	4.545	0.00820	0.02119
5 1/2	23	C-95	12940		540	608	630	0.415	4.67	4.545	0.00820	0.02119
5 1/2	23	P-110	14540		643	724	729	0.415	4.67	4.545	0.00820	0.02119
5 1/2	23	Q-125	16070		694	782	829	0.415	4.67	4.545	0.00820	0.02119
5 1/2	23	LS-140	17500		771	869	928	0.415	4.67	4.545	0.00820	0.02119
5 1/2	23	V-150	18390		823	927	995	0.415	4.67	4.545	0.00820	0.02119
5 1/2	26	C-90	14240		598	579	676	0.476	4.548	4.423	0.00929	0.02009
5 1/2	26	T-95	15030		628	608	714	0.476	4.548	4.423	0.00929	0.02009
5 1/2	26	C-95	15030		628	608	714	0.476	4.548	4.423	0.00929	0.02009
5 1/2	26	P-110	17400		748	724	826	0.476	4.548	4.423	0.00929	0.02009
5 1/2	26	Q-125	19770		808	782	939	0.476	4.548	4.423	0.00929	0.02009
5 1/2	26	V-150	23720		957	927	1127	0.476	4.548	4.423	0.00929	0.02009
5 1/2	26.8	C-90	14880				707	0.5	4.5	4.375	0.00971	0.01967
5 1/2	26.8	T-95	15700				746	0.5	4.5	4.375	0.00971	0.01967
5 1/2	29.7	C-90	16510				785	0.562	4.376	4.251	0.01078	0.01860
5 1/2	29.7	T-95	17430				828	0.562	4.376	4.251	0.01078	0.01860
5 1/2	32.6	C-90	18130				861	0.625	4.25	4.125	0.01184	0.01755
5 1/2	32.6	T-95	19140				909	0.625	4.25	4.125	0.01184	0.01755
5 1/2	35.3	C-90	19680				935	0.687	4.126	4.001	0.01285	0.01654
5 1/2	35.3	T-95	20760				987	0.687	4.126	4.001	0.01285	0.01654
5 1/2	38	C-90	21200				1007	0.75	4	3.875	0.01384	0.01554
5 1/2	38	T-95	22380				1063	0.75	4	3.875	0.01384	0.01554

5 1/2	40.5	C-90	22650				1076	0.812	3.876	3.751	0.01479	0.01459
5 1/2	40.5	T-95	23920				1136	0.812	3.876	3.751	0.01479	0.01459
5 1/2	43.1	C-90	24080				1144	0.875	3.75	3.625	0.01573	0.01366
5 1/2	43.1	T-95	25400				1208	0.875	3.75	3.625	0.01573	0.01366

Table 5 5 1/2" Casing Data

4.3.4. 5 5/8" Casing Data

O.D. (inch)	Nominal Weight T & C lbs/ft	Grade	Collapse Pressure (psi)	Joint Strength 1000 lbs			Body Yield 1000 lbs	Wall (inch)	I.D. (inch)	Drift Diameter (inch)	Displacement (bbl/ft)	Capacity (bbl/ft)
				STC	LTC	BTC						
5 5/8	26.7	L-80	12420		488	550	617	0.477	4.671		0.00954	0.02120
5 5/8	26.7	HCL-80	14750		501	550	617	0.477	4.671		0.00954	0.02120
5 5/8	26.7	H2S-90	14750		514	579	694	0.477	4.671		0.00954	0.02120
5 5/8	26.7	H2S-90	14750		539	608	733	0.477	4.671		0.00954	0.02120
5 5/8	26.7	P-110	17080		642	724	849	0.477	4.671		0.00954	0.02120

Table 6 5 5/8" Casing Data

4.3.5. 5 3/4" Casing Data

O.D. (inch)	Nominal Weight T & C lbs/ft	Grade	Collapse Pressure (psi)	Joint Strength 1000 lbs			Body Yield 1000 lbs	Wall (inch)	I.D. (inch)	Drift Diameter (inch)	Displacement (bbl/ft)	Capacity (bbl/ft)
				STC	LTC	BTC						
5 3/4	16.5	J-55	3720			314	234	0.276	5.198		0.00587	0.02625
5 3/4	18.1	J-55	4520			344	286	0.304	5.142		0.00643	0.02569
5 3/4	18.1	L-80	5700			447	416	0.304	5.142		0.00643	0.02569
5 3/4	18.1	N-80	5700			466	416	0.304	5.142		0.00643	0.02569
5 3/4	18.1	C-95	6380			502	494	0.304	5.142		0.00643	0.02569
5 3/4	18.1	P-110	6640			594	572	0.304	5.142		0.00643	0.02569
5 3/4	19.7	J-55	5410			377	313	0.335	5.08		0.00705	0.02507
5 3/4	19.7	L-80	7030			490	456	0.335	5.08		0.00705	0.02507
5 3/4	19.7	N-80	7030			511	456	0.335	5.08		0.00705	0.02507
5 3/4	19.7	C-95	7980			550	541	0.335	5.08		0.00705	0.02507
5 3/4	19.7	P-110	8530			651	627	0.335	5.08		0.00705	0.02507
5 3/4	21.8	L-80	8740			545	507	0.375	5		0.00783	0.02429
5 3/4	21.8	N-80	8740			568	507	0.375	5		0.00783	0.02429
5 3/4	21.8	C-95	10050			611	602	0.375	5		0.00783	0.02429
5 3/4	21.8	P-110	10960			723	697	0.375	5		0.00783	0.02429
5 3/4	24.2	L-80	10650			605	563	0.42	4.91		0.00870	0.02342
5 3/4	24.2	N-80	10650			630	563	0.42	4.91		0.00870	0.02342
5 3/4	24.2	C-95	12370			679	668	0.42	4.91		0.00870	0.02342
5 3/4	24.2	P-110	13700			803	774	0.42	4.91		0.00870	0.02342

Table 7 5 3/4" Casing Data

4.3.6. 6 5/8” Casing Data

O.D. (inch)	Nominal Weight T & C lbs/ft	Grade	Collapse Pressure (psi)	Joint Strength 1000 lbs			Body Yield 1000 lbs	Wall (inch)	I.D. (inch)	Drift Diameter (inch)	Displacement (bbl/ft)	Capacity (bbl/ft)
				STC	LTC	BTC						
6 5/8	20	H-40	2520	184			229	0.288	6.049	5.924	0.00709	0.03555
6 5/8	20	J-55	2970	245	266	374	315	0.288	6.049	5.924	0.00709	0.03555
6 5/8	20	K-55	2970	267	290	453	315	0.288	6.049	5.924	0.00709	0.03555
6 5/8	20	LS-65	3190	285	309	428	373	0.288	6.049	5.924	0.00709	0.03555
6 5/8	24	J-55	4560	314	340	453	382	0.352	5.921	5.796	0.00858	0.03406
6 5/8	24	K-55	4560	342	372	548	382	0.352	5.921	5.796	0.00858	0.03406
6 5/8	24	LS-65	5080	366	397	518	451	0.352	5.921	5.796	0.00858	0.03406
6 5/8	24	L-80	5760		473	592	555	0.352	5.921	5.796	0.00858	0.03406
6 5/8	24	C-90	6140		520	633	624	0.352	5.921	5.796	0.00858	0.03406
6 5/8	24	C-95	6310		546	665	659	0.352	5.921	5.796	0.00858	0.03406
6 5/8	24	P-110	6730		641	786	763	0.352	5.921	5.796	0.00858	0.03406
6 5/8	28	LS-65	7010		483	607	529	0.417	5.791	5.666	0.01006	0.03258
6 5/8	28	L-80	8170		576	693	651	0.417	5.791	5.666	0.01006	0.03258
6 5/8	28	N-80	8170		586	721	651	0.417	5.791	5.666	0.01006	0.03258
6 5/8	28	C-90	8880		633	742	732	0.417	5.791	5.666	0.01006	0.03258
6 5/8	28	C-95	9220		665	780	773	0.417	5.791	5.666	0.01006	0.03258
6 5/8	28	P-110	10160		781	922	895	0.417	5.791	5.666	0.01006	0.03258
6 5/8	32	L-80	10320		666	783	734	0.475	5.675	5.55	0.01135	0.03129
6 5/8	32	N-80	10320		677	814	734	0.475	5.675	5.55	0.01135	0.03129
6 5/8	32	C-90	11330		732	837	826	0.475	5.675	5.55	0.01135	0.03129
6 5/8	32	C-95	11810		769	880	872	0.475	5.675	5.55	0.01135	0.03129
6 5/8	32	P-110	13220		904	1040	1009	0.475	5.675	5.55	0.01135	0.03129
6 5/8	32	Q-125	14530		989	1138	1147	0.475	5.675	5.55	0.01135	0.03129

Table 8 6 5/8” Casing Data

4.3.7. 7” Casing Data

O.D. (inch)	Nominal Weight T & C lbs/ft	Grade	Collapse Pressure (psi)	Joint Strength 1000 lbs			Body Yield 1000 lbs	Wall (inch)	I.D. (inch)	Drift Diameter (inch)	Displacement (bbl/ft)	Capacity (bbl/ft)
				STC	LTC	BTC						
7	20	H-40	1970	176			230	0.272	6.456	6.331	0.00711	0.04049
7	20	J-55	2270	234	257	373	316	0.272	6.456	6.331	0.00711	0.04049
7	20	K-55	2270	254	281	451	316	0.272	6.456	6.331	0.00711	0.04049
7	20	LS-65	2480	272	300	427	374	0.272	6.456	6.331	0.00711	0.04049
7	23	J-55	3270	284	313	432	366	0.317	6.366	6.241	0.00823	0.03937
7	23	K-55	3270	309	341	522	366	0.317	6.366	6.241	0.00823	0.03937
7	23	LS-65	3540	331	364	494	433	0.317	6.366	6.241	0.00823	0.03937
7	23	L-80	3830		435	565	532	0.317	6.366	6.241	0.00823	0.03937
7	23	HCL-80	5650		485	614	532	0.317	6.366	6.241	0.00823	0.03937
7	23	N-80	3830		442	588	532	0.317	6.366	6.241	0.00823	0.03937
7	23	HCN-80	5650		485	614	532	0.317	6.366	6.241	0.00823	0.03937
7	23	C-90	4030		479	605	599	0.317	6.366	6.241	0.00823	0.03937
7	23	H2S-90	5650		485	614	599	0.317	6.366	6.241	0.00823	0.03937
7	23	S-95	5650		512	659	632	0.317	6.366	6.241	0.00823	0.03937
7	23	T-95	4140		505	636	632	0.317	6.366	6.241	0.00823	0.03937
7	23	H2S-95	5650		505	636	632	0.317	6.366	6.241	0.00823	0.03937
7	23	C-95	4140		505	636	632	0.317	6.366	6.241	0.00823	0.03937
7	26	J-55	4320	334	367	490	415	0.362	6.276	6.151	0.00934	0.03826
7	26	K-55	4320	364	401	592	415	0.362	6.276	6.151	0.00934	0.03826
7	26	LS-65	4800	389	428	561	491	0.362	6.276	6.151	0.00934	0.03826
7	26	L-80	5410		511	641	604	0.362	6.276	6.151	0.00934	0.03826
7	26	HCL-80	7800		570	696	604	0.362	6.276	6.151	0.00934	0.03826
7	26	N-80	5410		519	667	604	0.362	6.276	6.151	0.00934	0.03826
7	26	HCN-80	7800		570	696	604	0.362	6.276	6.151	0.00934	0.03826
7	26	C-90	5740		563	687	679	0.362	6.276	6.151	0.00934	0.03826
7	26	H2S-90	7800		570	696	679	0.362	6.276	6.151	0.00934	0.03826
7	26	S-95	7800		602	747	717	0.362	6.276	6.151	0.00934	0.03826

7	26	T-95	5880		593	722	717	0.362	6.276	6.151	0.00934	0.03826
7	26	H2S-95	7800		593	722	717	0.362	6.276	6.151	0.00934	0.03826
7	26	C-95	5880		593	722	717	0.362	6.276	6.151	0.00934	0.03826
7	26	HCP-110	7800		693	853	830	0.362	6.276	6.151	0.00934	0.03826
7	26	P-110	6230		639	853	830	0.362	6.276	6.151	0.00934	0.03826
7	29	LS-65	6090		492	628	549	0.408	6.184	6.059	0.01045	0.03715
7	29	L-80	7020		587	718	676	0.408	6.184	6.059	0.01045	0.03715
7	29	HCL-80	9200		655	780	676	0.408	6.184	6.059	0.01045	0.03715
7	29	N-80	7020		597	746	676	0.408	6.184	6.059	0.01045	0.03715
7	29	HCN-80	9200		655	780	676	0.408	6.184	6.059	0.01045	0.03715
7	29	C-90	7580		648	768	760	0.408	6.184	6.059	0.01045	0.03715
7	29	H2S-90	9200		655	780	760	0.408	6.184	6.059	0.01045	0.03715
7	29	S-95	9200		692	836	803	0.408	6.184	6.059	0.01045	0.03715
7	29	T-95	7830		683	808	803	0.408	6.184	6.059	0.01045	0.03715
7	29	H2S-95	9200		683	8080	803	0.408	6.184	6.059	0.01045	0.03715
7	29	C-95	7830		683	808	803	0.408	6.184	6.059	0.01045	0.03715
7	29	HCP-110	9200		797	955	929	0.408	6.184	6.059	0.01045	0.03715
7	29	P-110	8530		797	955	929	0.408	6.184	6.059	0.01045	0.03715
7	29	HCQ-125	9200		885	1045	1056	0.408	6.184	6.059	0.01045	0.03715
7	29	Q-125	9100		885	1045	1056	0.408	6.184	6.059	0.01045	0.03715
7	29	V-150	9790		1049	1243	1267	0.408	6.184	6.059	0.01045	0.03715
7	32	L-80	8610		661	791	745	0.453	6.094	5.969	0.01152	0.03608
7	32	N-80	8610		672	823	745	0.453	6.094	5.969	0.01152	0.03608
7	32	HCN-80	10400		738	860	745	0.453	6.094	5.969	0.01152	0.03608
7	32	C-90	9380		729	847	839	0.453	6.094	5.969	0.01152	0.03608
7	32	H2S-90	10400		738	860	839	0.453	6.094	5.969	0.01152	0.03608
7	32	S-95	10400		779	922	885	0.453	6.094	5.969	0.01152	0.03608
7	32	T-95	9750		768	891	885	0.453	6.094	5.969	0.01152	0.03608
7	32	H2S-95	10400		768	891	885	0.453	6.094	5.969	0.01152	0.03608
7	32	C-95	9750		768	891	885	0.453	6.094	5.969	0.01152	0.03608
7	32	P-110	10780		897	1053	1025	0.453	6.094	5.969	0.01152	0.03608
7	32	Q-125	11720		996	1152	1165	0.453	6.094	5.969	0.01152	0.03608
7	32	LS-140	12540		1107	1283	1304	0.453	6.094	5.969	0.01152	0.03608

7	32	V-150	13020		1180	1370	1398	0.453	6.094	5.969	0.01152	0.03608
7	35	L-80	10180		734	833	814	0.498	6.004	5.879	0.01258	0.03502
7	35	HCL-80	11600		819	832	814	0.498	6.004	5.879	0.01258	0.03502
7	35	N-80	10180		746	876	814	0.498	6.004	5.879	0.01258	0.03502
7	35	HCN-80	11600		819	876	814	0.498	6.004	5.879	0.01258	0.03502
7	35	C-90	11170		809	876	915	0.498	6.004	5.879	0.01258	0.03502
7	35	H2S-90	11600		819	876	915	0.498	6.004	5.879	0.01258	0.03502
7	35	S-95	11650		865	964	966	0.498	6.004	5.879	0.01258	0.03502
7	35	T-95	11650		853	920	966	0.498	6.004	5.879	0.01258	0.03502
7	35	H2S-95	11650		853	920	966	0.498	6.004	5.879	0.01258	0.03502
7	35	C-95	11650		853	920	966	0.498	6.004	5.879	0.01258	0.03502
7	35	P-110	13020		996	1096	1119	0.498	6.004	5.879	0.01258	0.03502
7	35	Q-125	14310		1106	1183	1272	0.498	6.004	5.879	0.01258	0.03502
7	35	LS-140	15490		1229	1315	1424	0.498	6.004	5.879	0.01258	0.03502
7	35	V-150	16220		1311	1402	1526	0.498	6.004	5.879	0.01258	0.03502
7	38	L-80	11390		801	832	877	0.54	5.92	5.795	0.01356	0.03405
7	38	HCL-80	12700		831	832	877	0.54	5.92	5.795	0.01356	0.03405
7	38	N-80	11390		814	876	877	0.54	5.92	5.795	0.01356	0.03405
7	38	HCN-80	12700		831	876	877	0.54	5.92	5.795	0.01356	0.03405
7	38	C-90	12820		883	876	986	0.54	5.92	5.795	0.01356	0.03405
7	38	H2S-90	12820		883	876	986	0.54	5.92	5.795	0.01356	0.03405
7	38	S-95	13440		944	964	1041	0.54	5.92	5.795	0.01356	0.03405
7	38	T-95	13440		931	920	1041	0.54	5.92	5.795	0.01356	0.03405
7	38	H2S-95	13440		931	920	1041	0.54	5.92	5.795	0.01356	0.03405
7	38	C-95	13440		931	920	1041	0.54	5.92	5.795	0.01356	0.03405
7	38	P-110	15140		1087	1096	1205	0.54	5.92	5.795	0.01356	0.03405
7	38	Q-125	16750		1207	1183	1370	0.54	5.92	5.795	0.01356	0.03405
7	38	LS-140	18280		1341	1315	1534	0.54	5.92	5.795	0.01356	0.03405
7	38	V-150	19240		1430	1402	1644	0.54	5.92	5.795	0.01356	0.03405
7	41	C-90	13900		903	876	1069	0.59	5.82	5.695	0.01470	0.03290
7	41	H2S-90	13900		903	876	1069	0.59	5.82	5.695	0.01470	0.03290
7	41	T-95	14670		952	920	1129	0.59	5.82	5.695	0.01470	0.03290
7	41	H2S-95	14670		950	920	1129	0.59	5.82	5.695	0.01470	0.03290

7	41	P-110	16990		1111	1096	1307	0.59	5.82	5.695	0.01470	0.03290
7	41	Q-125	19300		1244	1183	1485	0.59	5.82	5.695	0.01470	0.03290
7	41	V-150	22820		1488	1402	1782	0.59	5.82	5.695	0.01470	0.03290
7	42.7	C-90	14640				1127	0.625	5.75	5.625	0.01548	0.03212
7	42.7	T-95	15450				1189	0.625	5.75	5.625	0.01548	0.03212
7	46.4	C-90	15930				1226	0.687	5.626	5.5	0.01685	0.03075
7	46.4	T-95	16820				1294	0.687	5.626	5.5	0.01685	0.03075
7	50.1	C-90	17220				1325	0.75	5.5	5.375	0.01821	0.02939
7	50.1	T-95	18810				1399	0.75	5.5	5.375	0.01821	0.02939
7	53.6	C-90	18460				1421	0.812	5.376	5.251	0.01952	0.02808
7	53.6	T-95	19480				1500	0.812	5.376	5.251	0.01952	0.02808
7	57.1	C-90	19690				1515	0.875	5.25	5.125	0.02083	0.02678
7	57.1	T-95	20780				1600	0.875	5.25	5.125	0.02083	0.02678

Table 9 7" Casing Data

4.3.8. 7 5/8" Casing Data

O.D. (inch)	Nominal Weight T & C lbs/ft	Grade	Collapse Pressure (psi)	Joint Strength 1000 lbs			Body Yield 1000 lbs	Wall (inch)	I.D. (inch)	Drift Diameter (inch)	Displacement (bbl/ft)	Capacity (bbl/ft)
				STC	LTC	BTC						
7 5/8	24	H-40	2030	212			276	0.3	7.025	6.9	0.00854	0.04794
7 5/8	26.4	J-55	2890	315	346	483	414	0.328	6.969	6.844	0.00930	0.04718
7 5/8	26.4	K-55	2890	342	377	581	414	0.328	6.969	6.844	0.00930	0.04718
7 5/8	26.4	LS-65	3100	368	403	554	489	0.328	6.969	6.844	0.00930	0.04718
7 5/8	26.4	L-80	3400		482	635	602	0.328	6.969	6.844	0.00930	0.04718
7 5/8	26.4	HCL-80	4850		533	691	602	0.328	6.969	6.844	0.00930	0.04718
7 5/8	26.4	N-80	3400		490	659	602	0.328	6.969	6.844	0.00930	0.04718
7 5/8	26.4	C-90	3610		532	681	677	0.328	6.969	6.844	0.00930	0.04718

7 5/8	26.4	H2S-90	4850		553	691	677	0.328	6.969	6.844	0.00930	0.04718
7 5/8	26.4	S-95	4850		568	740	714	0.328	6.969	6.844	0.00930	0.04718
7 5/8	26.4	T-95	3710		560	716	714	0.328	6.969	6.844	0.00930	0.04718
7 5/8	26.4	H2S-95	4850		560	716	714	0.328	6.969	6.844	0.00930	0.04718
7 5/8	26.4	C-95	3710		560	716	714	0.328	6.969	6.844	0.00930	0.04718
7 5/8	26.4	HCP-110	4850		654	845	827	0.328	6.969	6.844	0.00930	0.04718
7 5/8	26.4	P-110	3920		654	845	827	0.328	6.969	6.844	0.00930	0.04718
7 5/8	29.7	LS-65	4310		474	629	555	0.375	6.875	6.75	0.01056	0.04592
7 5/8	29.7	L-80	4790		566	721	683	0.375	6.875	6.75	0.01056	0.04592
7 5/8	29.7	HCL-80	7150		650	785	683	0.375	6.875	6.75	0.01056	0.04592
7 5/8	29.7	N-80	4790		575	749	683	0.375	6.875	6.75	0.01056	0.04592
7 5/8	29.7	HCN-80	7150		650	785	683	0.375	6.875	6.75	0.01056	0.04592
7 5/8	29.7	C-90	5040		625	773	769	0.375	6.875	6.75	0.01056	0.04592
7 5/8	29.7	H2S-90	7150		650	785	769	0.375	6.875	6.75	0.01056	0.04592
7 5/8	29.7	S-95	7150		668	841	811	0.375	6.875	6.75	0.01056	0.04592
7 5/8	29.7	T-95	5140		659	813	811	0.375	6.875	6.75	0.01056	0.04592
7 5/8	29.7	H2S-95	7150		659	813	811	0.375	6.875	6.75	0.01056	0.04592
7 5/8	29.7	C-95	5140		659	813	811	0.375	6.875	6.75	0.01056	0.04592
7 5/8	29.7	HCP-110	7150		769	960	940	0.375	6.875	6.75	0.01056	0.04592
7 5/8	29.7	P-110	5350		769	960	940	0.375	6.875	6.75	0.01056	0.04592
7 5/8	33.7	L-80	6560		664	820	778	0.43	6.765	6.64	0.01202	0.04446
7 5/8	33.7	HCL-80	8800		762	894	778	0.43	6.765	6.64	0.01202	0.04446
7 5/8	33.7	N-80	6560		674	852	778	0.43	6.765	6.64	0.01202	0.04446
7 5/8	33.7	HCN-80	8800		762	894	778	0.43	6.765	6.64	0.01202	0.04446
7 5/8	33.7	C-90	7050		733	880	875	0.43	6.765	6.64	0.01202	0.04446
7 5/8	33.7	H2S-90	8800		762	894	875	0.43	6.765	6.64	0.01202	0.04446
7 5/8	33.7	S-95	8800		783	957	923	0.43	6.765	6.64	0.01202	0.04446
7 5/8	33.7	T-95	7280		772	925	923	0.43	6.765	6.64	0.01202	0.04446
7 5/8	33.7	H2S-95	8800		772	925	923	0.43	6.765	6.64	0.01202	0.04446
7 5/8	33.7	C-95	7280		772	925	923	0.43	6.765	6.64	0.01202	0.04446
7 5/8	33.7	HCP-110	8800		901	1093	1069	0.43	6.765	6.64	0.01202	0.04446
7 5/8	33.7	P-110	7870		901	1093	1069	0.43	6.765	6.64	0.01202	0.04446
7 5/8	33.7	HCQ-125	8800		1009	1197	1215	0.43	6.765	6.64	0.01202	0.04446

7 5/8	33.7	Q-125	8350		1009	1197	1215	0.43	6.765	6.64	0.01202	0.04446
7 5/8	33.7	LS-140	8690		1128	1334	1361	0.43	6.765	6.64	0.01202	0.04446
7 5/8	33.7	V-150	8850		1207	1424	1458	0.43	6.765	6.64	0.01202	0.04446
7 5/8	39	L-80	8820		786	945	895	0.5	6.625	6.5	0.01384	0.04264
7 5/8	39	HCL-80	10600		901	1029	895	0.5	6.625	6.5	0.01384	0.04264
7 5/8	39	N-80	8820		798	981	895	0.5	6.625	6.5	0.01384	0.04264
7 5/8	39	HCN-80	10600		901	1029	895	0.5	6.625	6.5	0.01384	0.04264
7 5/8	39	C-90	9620		867	1013	1007	0.5	6.625	6.5	0.01384	0.04264
7 5/8	39	H2S-90	10600		901	1029	1007	0.5	6.625	6.5	0.01384	0.04264
7 5/8	39	S-95	10600		926	1101	1063	0.5	6.625	6.5	0.01384	0.04264
7 5/8	39	T-95	10000		914	1065	1063	0.5	6.625	6.5	0.01384	0.04264
7 5/8	39	H2S-95	10600		914	1065	1063	0.5	6.625	6.5	0.01384	0.04264
7 5/8	39	C-95	10000		914	1065	1063	0.5	6.625	6.5	0.01384	0.04264
7 5/8	39	P-110	11080		1066	1258	1231	0.5	6.625	6.5	0.01384	0.04264
7 5/8	39	Q-125	12060		1194	1379	1399	0.5	6.625	6.5	0.01384	0.04264
7 5/8	39	LS-140	12930		1335	1536	1567	0.5	6.625	6.5	0.01384	0.04264
7 5/8	39	V-150	13440		1428	1640	1679	0.5	6.625	6.5	0.01384	0.04264
7 5/8	42.8	L-80	10810		891	1053	998	0.562	6.501	6.376	0.01542	0.04106
7 5/8	42.8	N-80	10810		905	1093	998	0.562	6.501	6.376	0.01542	0.04106
7 5/8	42.8	C-90	11890		983	1129	1122	0.562	6.501	6.376	0.01542	0.04106
7 5/8	42.8	T-95	12410		1037	1187	1185	0.562	6.501	6.376	0.01542	0.04106
7 5/8	42.8	C-95	12410		1037	1187	1185	0.562	6.501	6.376	0.01542	0.04106
7 5/8	42.8	P-110	13920		1210	1402	1372	0.562	6.501	6.376	0.01542	0.04106
7 5/8	42.8	Q-125	15350		1355	1536	1559	0.562	6.501	6.376	0.01542	0.04106
7 5/8	45.3	L-80	11510		947	1109	1051	0.595	6.435	6.31	0.01625	0.04023
7 5/8	45.3	HCL-80	12900		1086	1177	1051	0.595	6.435	6.31	0.01625	0.04023
7 5/8	45.3	N-80	11510		962	1152	1051	0.595	6.435	6.31	0.01625	0.04023
7 5/8	45.3	HCN-80	12900		1086	1208	1051	0.595	6.435	6.31	0.01625	0.04023
7 5/8	45.3	C-90	12950		1045	1189	1183	0.595	6.435	6.31	0.01625	0.04023
7 5/8	45.3	H2S-90	12950		1086	1208	1183	0.595	6.435	6.31	0.01625	0.04023
7 5/8	45.3	S-95	13660		1116	1293	1248	0.595	6.435	6.31	0.01625	0.04023
7 5/8	45.3	H2S-95	13660		1101	1251	1248	0.595	6.435	6.31	0.01625	0.04023
7 5/8	45.3	C-95	13660		1101	1251	1248	0.595	6.435	6.31	0.01625	0.04023

7 5/8	45.3	P-110	15430		1285	1477	1446	0.595	6.435	6.31	0.01625	0.04023
7 5/8	45.3	Q-125	17090		1439	1619	1643	0.595	6.435	6.31	0.01625	0.04023
7 5/8	45.3	V-150	19660		1721	1926	1971	0.595	6.435	6.31	0.01625	0.04023
7 5/8	47.1	L-80	12040		997	1160	1100	0.625	6.375	6.25	0.01700	0.03948
7 5/8	47.1	N-80	12040		1013	1205	1100	0.625	6.375	6.25	0.01700	0.03948
7 5/8	47.1	C-90	13540		1100	1238	1237	0.625	6.375	6.25	0.01700	0.03948
7 5/8	47.1	T-95	14300		1159	1300	1306	0.625	6.375	6.25	0.01700	0.03948
7 5/8	47.1	C-95	14300		1159	1300	1306	0.625	6.375	6.25	0.01700	0.03948
7 5/8	47.1	P-110	16550		1353	1545	1512	0.625	6.375	6.25	0.01700	0.03948
7 5/8	47.1	Q-125	18700		1515	1672	1718	0.625	6.375	6.25	0.01700	0.03948
7 5/8	51.2	C-90	14760				1348	0.687	6.251	6.126	0.01852	0.03796
7 5/8	51.2	T-95	15580				1423	0.687	6.251	6.126	0.01852	0.03796
7 5/8	55.3	C-90	15960				1458	0.75	6.125	6	0.02004	0.03644
7 5/8	55.3	T-95	16850				1539	0.75	6.125	6	0.02004	0.03644

Table 10 7 5/8" Casing Data

4.3.9. 7 ¾” Casing Data

O.D. (inch)	Nominal Weight T & C lbs/ft	Grade	Collapse Pressure (psi)	Joint Strength 1000 lbs			Body Yield 1000 lbs	Wall (inch)	I.D. (inch)	Drift Diameter (inch)	Displacement (bbl/ft)	Capacity (bbl/ft)
				STC	LTC	BTC						
7 3/4	46.1	L-80	11340		841	1001	1070	0.595	6.56	6.435	0.01654	0.04180
7 3/4	46.1	HCL-80	13320		965	1091	1070	0.595	6.56	6.435	0.01654	0.04180
7 3/4	46.1	C-90	12740		928	1074	1204	0.595	6.56	6.435	0.01654	0.04180
7 3/4	46.1	H2S-90	12740		965	1091	1204	0.595	6.56	6.435	0.01654	0.04180
7 3/4	46.1	S-95	13320		992	1168	1271	0.595	6.56	6.435	0.01654	0.04180
7 3/4	46.1	T-95	13320		978	1129	1271	0.595	6.56	6.435	0.01654	0.04180
7 3/4	46.1	H2S-95	13320		978	1129	1271	0.595	6.56	6.435	0.01654	0.04180
7 3/4	46.1	C-95	13320		978	1129	1271	0.595	6.56	6.435	0.01654	0.04180
7 3/4	46.1	P-110	14990		1142	1334	1471	0.595	6.56	6.435	0.01654	0.04180
7 3/4	46.1	Q-125	16580		1279	1462	1672	0.595	6.56	6.435	0.01654	0.04180
7 3/4	46.1	LS-140	18090		1429	1628	1872	0.595	6.56	6.435	0.01654	0.04180

Table 11 7 3/4" Casing Data

4.3.10. 8 5/8” Casing Data

O.D. (inch)	Nominal Weight T & C lbs/ft	Grade	Collapse Pressure (psi)	Joint Strength 1000 lbs			Body Yield 1000 lbs	Wall (inch)	I.D. (inch)	Drift Diameter (inch)	Displacement (bbl/ft)	Capacity (bbl/ft)
				STC	LTC	BTC						
8 5/8	24	J-55	1370	244			381	0.264	8.097	7.972	0.00858	0.06369
8 5/8	24	K-55	1370	263			381	0.264	8.097	7.972	0.00858	0.06369
8 5/8	24	HCK-55	1780	326			381	0.264	8.097	7.972	0.00858	0.06369
8 5/8	24	LS-65	1430	302			451	0.264	8.097	7.972	0.00858	0.06369
8 5/8	28	H-40	1610	233			318	0.304	8.017	7.892	0.00983	0.06244
8 5/8	28	HCK-55	2680	414	464	651	437	0.304	8.017	7.892	0.00983	0.06244
8 5/8	32	H-40	2200	279			366	0.352	7.921	7.796	0.01132	0.06095
8 5/8	32	J-55	2530	372	417	579	503	0.352	7.921	7.796	0.01132	0.06095
8 5/8	32	K-55	2530	402	452	690	503	0.352	7.921	7.796	0.01132	0.06095
8 5/8	32	HCK-55	4130	497	556	749	503	0.352	7.921	7.796	0.01132	0.06095
8 5/8	32	LS-65	2740	435	487	664	595	0.352	7.921	7.796	0.01132	0.06095
8 5/8	36	J-55	3450	434	486	654	568	0.4	7.825	7.7	0.01278	0.05948
8 5/8	36	K-55	3450	468	526	780	568	0.4	7.825	7.7	0.01278	0.05948
8 5/8	36	HCK-55	5300	579	648	847	568	0.4	7.825	7.7	0.01278	0.05948
8 5/8	36	LS-65	3760	506	567	751	672	0.4	7.825	7.7	0.01278	0.05948
8 5/8	36	L-80	4100		678	864	827	0.4	7.825	7.7	0.01278	0.05948
8 5/8	36	HCL-80	6060		779	945	827	0.4	7.825	7.7	0.01278	0.05948
8 5/8	36	N-80	4100		688	895	827	0.4	7.825	7.7	0.01278	0.05948
8 5/8	36	HCN-80	6060		779	945	827	0.4	7.825	7.7	0.01278	0.05948
8 5/8	40	LS-65	4890		649	839	751	0.45	7.725	7.6	0.01429	0.05797
8 5/8	40	L-80	5520		776	966	925	0.45	7.725	7.6	0.01429	0.05797
8 5/8	40	HCL-80	7900		892	1057	925	0.45	7.725	7.6	0.01429	0.05797
8 5/8	40	N-80	5520		788	1001	925	0.45	7.725	7.6	0.01429	0.05797
8 5/8	40	HCN-80	7900		892	1057	925	0.45	7.725	7.6	0.01429	0.05797
8 5/8	40	C-90	5870		858	1038	1040	0.45	7.725	7.6	0.01429	0.05797
8 5/8	40	H2S-90	7900		892	1057	1040	0.45	7.725	7.6	0.01429	0.05797
8 5/8	40	S-95	7900		915	1127	1098	0.45	7.725	7.6	0.01429	0.05797

8 5/8	40	T-95	6020		904	1092	1098	0.45	7.725	7.6	0.01429	0.05797
8 5/8	40	H2S-95	7900		904	1092	1098	0.45	7.725	7.6	0.01429	0.05797
8 5/8	40	C-95	6020		904	1092	1098	0.45	7.725	7.6	0.01429	0.05797
8 5/8	40	HCP-110	7900		1055	1228	1271	0.45	7.725	7.6	0.01429	0.05797
8 5/8	40	P-110	6390		1055	1228	1271	0.45	7.725	7.6	0.01429	0.05797
8 5/8	49	L-80	8580		983	1180	1129	0.557	7.511	7.386	0.01746	0.05480
8 5/8	49	HCL-80	10400		1129	1291	1129	0.557	7.511	7.386	0.01746	0.05480
8 5/8	49	N-80	8580		997	1222	1129	0.557	7.511	7.386	0.01746	0.05480
8 5/8	49	HCN-80	10400		1129	1291	1129	0.557	7.511	7.386	0.01746	0.05480
8 5/8	49	H2S-90	10400		1129	1291	1271	0.557	7.511	7.386	0.01746	0.05480
8 5/8	49	S-95	10400		1159	1377	1341	0.557	7.511	7.386	0.01746	0.05480
8 5/8	49	T-95	9710		1144	1334	1341	0.557	7.511	7.386	0.01746	0.05480
8 5/8	49	H2S-95	10400		1144	1334	1341	0.557	7.511	7.386	0.01746	0.05480
8 5/8	49	C-95	9710		1144	1334	1341	0.557	7.511	7.386	0.01746	0.05480
8 5/8	49	P-110	10740		1335	1574	1553	0.557	7.511	7.386	0.01746	0.05480
8 5/8	49	Q-125	11650		1496	1728	1765	0.557	7.511	7.386	0.01746	0.05480
8 5/8	49	V-150	12950		1789	2056	2118	0.557	7.511	7.386	0.01746	0.05480
8 5/8	44	L-80	6950		874	1066	1021	5	7.625	7.5	0.01579	0.05648
8 5/8	44	HCL-80	9100		1004	1167	1021	5	7.625	7.5	0.01579	0.05648
8 5/8	44	N-80	6950		887	1105	1021	5	7.625	7.5	0.01579	0.05648
8 5/8	44	HCN-80	9100		1004	1167	1021	5	7.625	7.5	0.01579	0.05648
8 5/8	44	C-90	7490		965	1146	1149	5	7.625	7.5	0.01579	0.05648
8 5/8	44	H2S-90	9100		1004	1167	1149	5	7.625	7.5	0.01579	0.05648
8 5/8	44	S-95	9100		1030	1244	1212	5	7.625	7.5	0.01579	0.05648
8 5/8	44	T-95	7740		1017	1206	1212	5	7.625	7.5	0.01579	0.05648
8 5/8	44	H2S-95	9100		1017	1206	1212	5	7.625	7.5	0.01579	0.05648
8 5/8	44	C-95	7740		1017	1206	1212	5	7.625	7.5	0.01579	0.05648
8 5/8	44	HCP-110	9100		1186	1423	1404	5	7.625	7.5	0.01579	0.05648
8 5/8	44	P-110	8420		1186	1423	1404	5	7.625	7.5	0.01579	0.05648
8 5/8	44	HCQ-125	9100		1330	1562	1595	5	7.625	7.5	0.01579	0.05648
8 5/8	44	Q-125	8980		1330	1562	1595	5	7.625	7.5	0.01579	0.05648
8 5/8	44	V-150	9640		1591	1859	1914	5	7.625	7.5	0.01579	0.05648

Table 12 8 5/8" Casing Data

4.3.11. 9 5/8” Casing Data

O.D. (inch)	Nominal Weight T & C lbs/ft	Grade	Collapse Pressure (psi)	Joint Strength 1000 lbs			Body Yield 1000 lbs	Wall (inch)	I.D. (inch)	Drift Diameter (inch)	Displacement (bbl/ft)	Capacity (bbl/ft)
				STC	LTC	BTC						
9 5/8	32.3	H-40	1370	254			365	0.312	9.001	8.845	0.01129	0.07870
9 5/8	36	H-40	1720	294			410	0.352	8.921	8.765	0.01268	0.07731
9 5/8	36	J-55	2020	394	453	639	564	0.352	8.921	8.765	0.01268	0.07731
9 5/8	36	K-55	2020	423	489	755	564	0.352	8.921	8.765	0.01268	0.07731
9 5/8	36	HCK-55	2980	526	605	829	564	0.352	8.921	8.765	0.01268	0.07731
9 5/8	36	LS-65	2190	460	529	734	667	0.352	8.921	8.765	0.01268	0.07731
9 5/8	40	J-55	2570	452	520	714	630	0.395	8.835	8.679	0.01417	0.07583
9 5/8	40	K-55	2570	486	561	843	630	0.395	8.835	8.679	0.01417	0.07583
9 5/8	40	HCK-55	4230	604	64	926	630	0.395	8.835	8.679	0.01417	0.07583
9 5/8	40	LS-65	2770	528	608	823	745	0.395	8.835	8.679	0.01417	0.07583
9 5/8	40	L-80	3090		727	947	916	0.395	8.835	8.679	0.01417	0.07583
9 5/8	40	HCL-80	4230		837	1042	916	0.395	8.835	8.679	0.01417	0.07583
9 5/8	40	N-80	3090		737	979	916	0.395	8.835	8.679	0.01417	0.07583
9 5/8	40	HCN-80	4230		837	1042	916	0.395	8.835	8.679	0.01417	0.07583
9 5/8	40	C-90	3250		804	1021	1031	0.395	8.835	8.679	0.01417	0.07583
9 5/8	40	H2S-90	4230		837	1042	1031	0.395	8.835	8.679	0.01417	0.07583
9 5/8	40	S-95	4230		858	1106	1088	0.395	8.835	8.679	0.01417	0.07583
9 5/8	40	T-95	3320		847	1074	1088	0.395	8.835	8.679	0.01417	0.07583
9 5/8	40	H2S-95	4230		847	1074	1088	0.395	8.835	8.679	0.01417	0.07583
9 5/8	40	C-95	3320		847	1074	1088	0.395	8.835	8.679	0.01417	0.07583
9 5/8	43.5	LS-65	3520		679	899	816	0.435	8.755	8.599	0.01553	0.07446
9 5/8	43.5	L-80	3810		813	1038	1005	0.435	8.755	8.599	0.01553	0.07446
9 5/8	43.5	HCL-80	5600		936	1142	1005	0.435	8.755	8.599	0.01553	0.07446
9 5/8	43.5	N-80	3810		825	1074	1005	0.435	8.755	8.599	0.01553	0.07446
9 5/8	43.5	HCN-80	5600		936	1142	1005	0.435	8.755	8.599	0.01553	0.07446
9 5/8	43.5	C-90	4010		899	1119	1130	0.435	8.755	8.599	0.01553	0.07446

9 5/8	43.5	H2S-90	5600		936	1142	1130	0.435	8.755	8.599	0.01553	0.07446
9 5/8	43.5	S-95	5600		959	1213	1193	0.435	8.755	8.599	0.01553	0.07446
9 5/8	43.5	T-95	4120		948	1178	1193	0.435	8.755	8.599	0.01553	0.07446
9 5/8	43.5	H2S-95	5600		948	1178	1193	0.435	8.755	8.599	0.01553	0.07446
9 5/8	43.5	C-95	4120		948	1178	1193	0.435	8.755	8.599	0.01553	0.07446
9 5/8	43.5	HCP-110	5600		1106	1388	1381	0.435	8.755	8.599	0.01553	0.07446
9 5/8	43.5	P-110	4420		1106	1388	1381	0.435	8.755	8.599	0.01553	0.07446
9 5/8	43.5	HCQ-125	5600		1240	1527	1570	0.435	8.755	8.599	0.01553	0.07446
9 5/8	43.5	Q-125	4620		1240	1527	1570	0.435	8.755	8.599	0.01553	0.07446
9 5/8	43.5	LS-140	5600		1386	1702	1758	0.435	8.755	8.599	0.01553	0.07446
9 5/8	47	L-80	4760		893	1122	1086	0.472	8.681	8.525	0.01679	0.07321
9 5/8	47	HCL-80	7100		1027	1234	1086	0.472	8.681	8.525	0.01679	0.07321
9 5/8	47	N-80	4760		905	1161	1086	0.472	8.681	8.525	0.01679	0.07321
9 5/8	47	HCN-80	7100		1027	1234	1086	0.472	8.681	8.525	0.01679	0.07321
9 5/8	47	C-90	5000		987	1210	1221	0.472	8.681	8.525	0.01679	0.07321
9 5/8	47	S-95	7100		1053	1311	1289	0.472	8.681	8.525	0.01679	0.07321
9 5/8	47	T-95	5090		1040	1273	1289	0.472	8.681	8.525	0.01679	0.07321
9 5/8	47	H2S-95	7100		1040	1273	1289	0.472	8.681	8.525	0.01679	0.07321
9 5/8	47	C-95	5090		1040	1273	1289	0.472	8.681	8.525	0.01679	0.07321
9 5/8	47	HCP-110	7100		1213	1500	1493	0.472	8.681	8.525	0.01679	0.07321
9 5/8	47	P-110	5300		1213	1500	1493	0.472	8.681	8.525	0.01679	0.07321
9 5/8	47	HCQ-125	7100		1361	1650	1697	0.472	8.681	8.525	0.01679	0.07321
9 5/8	47	Q-125	5640		1361	1650	1697	0.472	8.681	8.525	0.01679	0.07321
9 5/8	47	LS-140	7100		1521	1839	1900	0.472	8.681	8.525	0.01679	0.07321
9 5/8	53.5	L-80	6620		1047	1286	1244	0.545	8.535	8.379	0.01923	0.07077
9 5/8	53.5	HCL-80	8850		1205	1414	1244	0.545	8.535	8.379	0.01923	0.07077
9 5/8	53.5	N-80	6620		1062	1329	1244	0.545	8.535	8.379	0.01923	0.07077
9 5/8	53.5	HCN-80	8850		1205	1414	1244	0.545	8.535	8.379	0.01923	0.07077
9 5/8	53.5	C-90	7120		1157	1386	1399	0.545	8.535	8.379	0.01923	0.07077
9 5/8	53.5	H2S-90	8850		1205	1414	1399	0.545	8.535	8.379	0.01923	0.07077
9 5/8	53.5	S-95	8850		1235	1502	1477	0.545	8.535	8.379	0.01923	0.07077
9 5/8	53.5	T-95	7340		1220	1458	1477	0.545	8.535	8.379	0.01923	0.07077
9 5/8	53.5	H2S-95	8850		1220	1458	1477	0.545	8.535	8.379	0.01923	0.07077

9 5/8	53.5	C-95	7340		1220	1458	1477	0.545	8.535	8.379	0.01923	0.07077
9 5/8	53.5	HCP-110	8850		1422	1718	1710	0.545	8.535	8.379	0.01923	0.07077
9 5/8	53.5	P-110	7950		1422	1718	1710	0.545	8.535	8.379	0.01923	0.07077
9 5/8	53.5	HCQ-125	8850		1595	1890	1943	0.545	8.535	8.379	0.01923	0.07077
9 5/8	53.5	Q-125	8440		1595	1890	1943	0.545	8.535	8.379	0.01923	0.07077
9 5/8	53.5	LS-140	8850		1783	2107	2177	0.545	8.535	8.379	0.01923	0.07077
9 5/8	53.5	V-150	8960		1909	2251	2332	0.545	8.535	8.379	0.01923	0.07077
9 5/8	58.4	L-80	7890		1151	1396	1350	0.595	8.435	8.279	0.02088	0.06912
9 5/8	58.4	N-80	7890		1167	1443	1350	0.595	8.435	8.279	0.02088	0.06912
9 5/8	58.4	C-90	8560		1272	1504	1519	0.595	8.435	8.279	0.02088	0.06912
9 5/8	58.4	T-95	8880		1341	1583	1604	0.595	8.435	8.279	0.02088	0.06912
9 5/8	58.4	C-95	8880		1341	1583	1604	0.595	8.435	8.279	0.02088	0.06912
9 5/8	58.4	P-110	9760		1564	1865	1857	0.595	8.435	8.279	0.02088	0.06912
9 5/8	58.4	Q-125	10530		1754	2052	2110	0.595	8.435	8.279	0.02088	0.06912
9 5/8	59.4	C-90	8980				1553	0.609	8.407	8.251	0.02134	0.06866
9 5/8	59.4	T-95	9320				1634	0.609	8.407	8.251	0.02134	0.06866
9 5/8	64.9	C-90	10800				1701	0.672	8.281	8.125	0.02338	0.06662
9 5/8	64.9	T-95	11260				1796	0.672	8.281	8.125	0.02338	0.06662
9 5/8	70.3	C-90	12610				1845	0.734	8.157	8.001	0.02536	0.06464
9 5/8	70.3	T-95	13180				1948	0.734	8.157	8.001	0.02536	0.06464
9 5/8	75.6	C-90	13670				1989	0.797	8.031	7.875	0.02734	0.06265
9 5/8	75.6	T-95	14430				2100	0.797	8.031	7.875	0.02734	0.06265

Table 13 9 5/8" Casing Data

4.3.12. 9 ¾” Casing Data

O.D. (inch)	Nominal Weight T & C lbs/ft	Grade	Collapse Pressure (psi)	Joint Strength 1000 lbs			Body Yield 1000 lbs	Wall (inch)	I.D. (inch)	Drift Diameter (inch)	Displacement (bbl/ft)	Capacity (bbl/ft)
				STC	LTC	BTC						
9 3/4	59.2	H2S-90	9750		1175	1383	1540	0.595	8.56		0.02117	0.07118
9 3/4	59.2	S-95	9750		1204	1469	1626	0.595	8.56		0.02117	0.07118
9 3/4	59.2	H2S-95	9750		1189	1426	1626	0.595	8.56		0.02117	0.07118
9 3/4	59.2	HCP-110	9750		1387	1681	1882	0.595	8.56		0.02117	0.07118
9 3/4	59.2	P-110	9490		1387	1681	1882	0.595	8.56		0.02117	0.07118
9 3/4	59.2	Q-125	10210		1555	1850	2139	0.595	8.56		0.02117	0.07118
9 3/4	59.2	LS-140	10820		1739	2061	2396	0.595	8.56		0.02117	0.07118

Table 14 9 3/4" Casing Data

4.3.13. 9 7/8” Casing Data

O.D. (inch)	Nominal Weight T & C lbs/ft	Grade	Collapse Pressure (psi)	Joint Strength 1000 lbs			Body Yield 1000 lbs	Wall (inch)	I.D. (inch)	Drift Diameter (inch)	Displacement (bbl/ft)	Capacity (bbl/ft)
				STC	LTC	BTC						
9 7/8	62.8	H2S-90	10180		1096	1304	1635	0.625	8.625		0.02246	0.07227
9 7/8	62.8	S-95	10180		1123	1385	1725	0.625	8.625		0.02246	0.07227
9 7/8	62.8	H2S-95	10180		1109	1344	1725	0.625	8.625		0.02246	0.07227
9 7/8	62.8	P-110	10280		1294	1584	1998	0.625	8.625		0.02246	0.07227
9 7/8	62.8	Q-125	11140		1451	1743	2270	0.625	8.625		0.02246	0.07227
9 7/8	62.8	LS-140	11870		1622	1942	2543	0.625	8.625		0.02246	0.07227

Table 15 9 7/8" Casing Data

4.3.14. 10 ¾” Casing Data

O.D. (inch)	Nominal Weight T & C lbs/ft	Grade	Collapse Pressure (psi)	Joint Strength 1000 lbs			Body Yield 1000 lbs	Wall (inch)	I.D. (inch)	Drift Diameter (inch)	Displacement (bbl/ft)	Capacity (bbl/ft)
				STC	LTC	BTC						
10 3/4	32.75	H-40	840	205			367	0.279	10.192	10.036	0.01135	0.10091
10 3/4	40.5	H-40	1390	314			457	0.35	10.05	9.894	0.01414	0.09812
10 3/4	40.5	J-55	1580	420		700	629	0.35	10.05	9.894	0.01414	0.09812
10 3/4	40.5	K-55	1580	450		819	629	0.35	10.05	9.894	0.01414	0.09812
10 3/4	40.5	HCK-55	2100	562		911	629	0.35	10.05	9.894	0.01414	0.09812
10 3/4	40.5	LS-65	1680	491		806	743	0.35	10.05	9.894	0.01414	0.09812
10 3/4	40.5	N-80	1730	597		964	915	0.35	10.05	9.894	0.01414	0.09812
10 3/4	40.5	HCN-80	2100	681		1034	915	0.35	10.05	9.894	0.01414	0.09812
10 3/4	45.5	J-55	2090	493		796	715	0.4	9.95	9.794	0.01609	0.09617
10 3/4	45.5	HCK-55	3130	659		1037	715	0.4	9.95	9.794	0.01609	0.09617
10 3/4	45.5	LS-65	2280	576		916	845	0.4	9.95	9.794	0.01609	0.09617
10 3/4	45.5	N-80	2470	701		1097	1040	0.4	9.95	9.794	0.01609	0.09617
10 3/4	45.5	HCN-80	3130	799		1175	1040	0.4	9.95	9.794	0.01609	0.09617
10 3/4	51	J-55	2700	565		891	801	0.45	9.85	9.694	0.01801	0.09425
10 3/4	51	K-55	2700	606		1043	801	0.45	9.85	9.694	0.01801	0.09425
10 3/4	51	HCK-55	4420	756		1160	801	0.45	9.85	9.694	0.01801	0.09425
10 3/4	51	LS-65	2870	661		1026	946	0.45	9.85	9.694	0.01801	0.09425
10 3/4	51	L-80	3220	794		1190	1165	0.45	9.85	9.694	0.01801	0.09425
10 3/4	51	HCL-80	4460	906		1316	1165	0.45	9.85	9.694	0.01801	0.09425
10 3/4	51	N-80	3220	804		1228	1165	0.45	9.85	9.694	0.01801	0.09425
10 3/4	51	HCN-80	4460	916		1316	1165	0.45	9.85	9.694	0.01801	0.09425
10 3/4	51	C-90	3400	879		1287	1311	0.45	9.85	9.694	0.01801	0.09425
10 3/4	51	H2S-90	4460	916		1316	1311	0.45	9.85	9.694	0.01801	0.09425
10 3/4	51	S-95	4460	937		1392	1383	0.45	9.85	9.694	0.01801	0.09425
10 3/4	51	T-95	3480	927		1354	1383	0.45	9.85	9.694	0.01801	0.09425
10 3/4	51	H2S-95	4460	927		1354	1383	0.45	9.85	9.694	0.01801	0.09425
10 3/4	51	C-95	3480	927		1354	1383	0.45	9.85	9.694	0.01801	0.09425

10 3/4	51	HCP-110	4460	1080		1594	1602	0.45	9.85	9.694	0.01801	0.09425
10 3/4	51	P-110	3660	1080		1594	1602	0.45	9.85	9.694	0.01801	0.09425
10 3/4	51	HCQ-125	4660	1213		1758	1820	0.45	9.85	9.694	0.01801	0.09425
10 3/4	51	Q-125	3740	1213		1758	1820	0.45	9.85	9.694	0.01801	0.09425
10 3/4	51	LS-140	4460	1356		1959	2039	0.45	9.85	9.694	0.01801	0.09425
10 3/4	55.5	HCK-55	5220	843		1271	877	0.495	9.76	9.604	0.01972	0.09254
10 3/4	55.5	LS-65	3690	736		1124	877	0.495	9.76	9.604	0.01972	0.09254
10 3/4	55.5	L-80	4020	884		1303	1276	0.495	9.76	9.604	0.01972	0.09254
10 3/4	55.5	HCL-80	5950	1010		1441	1276	0.495	9.76	9.604	0.01972	0.09254
10 3/4	55.5	N-80	4020	895		1345	1276	0.495	9.76	9.604	0.01972	0.09254
10 3/4	55.5	HCN-80	5950	1021		1441	1276	0.495	9.76	9.604	0.01972	0.09254
10 3/4	55.5	C-90	4160	979		1409	1435	0.495	9.76	9.604	0.01972	0.09254
10 3/4	55.5	H2S-90	5950	1021		1441	1435	0.495	9.76	9.604	0.01972	0.09254
10 3/4	55.5	S-95	5950	1043		1524	1515	0.495	9.76	9.604	0.01972	0.09254
10 3/4	55.5	T-95	4290	1032		1483	1515	0.495	9.76	9.604	0.01972	0.09254
10 3/4	55.5	H2S-95	5950	1032		1483	1515	0.495	9.76	9.604	0.01972	0.09254
10 3/4	55.5	C-95	4290	1032		1483	1515	0.495	9.76	9.604	0.01972	0.09254
10 3/4	55.5	HCP-110	5950	1203		1745	1754	0.495	9.76	9.604	0.01972	0.09254
10 3/4	55.5	P-110	4610	1203		1745	1754	0.495	9.76	9.604	0.01972	0.09254
10 3/4	55.5	HCQ-125	5950	1351		1925	1993	0.495	9.76	9.604	0.01972	0.09254
10 3/4	55.5	Q-125	4850	1351		1925	1993	0.495	9.76	9.604	0.01972	0.09254
10 3/4	55.5	LS-140	5950	1510		2146	2233	0.495	9.76	9.604	0.01972	0.09254
10 3/4	60.7	L-80	5160	983		1428	1398	0.545	9.66	9.504	0.02161	0.09065
10 3/4	60.7	HCL-80	7550	1123		1579	1398	0.545	9.66	9.504	0.02161	0.09065
10 3/4	60.7	N-80	5160	996		1473	1398	0.545	9.66	9.504	0.02161	0.09065
10 3/4	60.7	N-80	5160	996		1473	1398	0.545	9.66	9.504	0.02161	0.09065
10 3/4	60.7	HCN-80	7550	1136		1579	1398	0.545	9.66	9.504	0.02161	0.09065
10 3/4	60.7	C-90	5460	1089		1544	1573	0.545	9.66	9.504	0.02161	0.09065
10 3/4	60.7	H2S-90	7550	1136		1579	1573	0.545	9.66	9.504	0.02161	0.09065
10 3/4	60.7	S-95	7550	1161		1670	1660	0.545	9.66	9.504	0.02161	0.09065
10 3/4	60.7	T-95	5590	1148		1625	1660	0.545	9.66	9.504	0.02161	0.09065
10 3/4	60.7	H2S-95	7550	1148		1625	1660	0.545	9.66	9.504	0.02161	0.09065
10 3/4	60.7	C-95	5590	1148		1625	1660	0.545	9.66	9.504	0.02161	0.09065

10 3/4	60.7	HCP-110	7550	1338		1912	1922	0.545	9.66	9.504	0.02161	0.09065
10 3/4	60.7	P-110	5880	1338		1912	1922	0.545	9.66	9.504	0.02161	0.09065
10 3/4	60.7	HCQ-125	7550	1503		2109	2184	0.545	9.66	9.504	0.02161	0.09065
10 3/4	60.7	Q-125	6070	1503		2109	2184	0.545	9.66	9.504	0.02161	0.09065
10 3/4	60.7	LS-140	7550	1680		2351	2446	0.545	9.66	9.504	0.02161	0.09065
10 3/4	65.7	L-80	6300	1082		1551	1519	0.595	9.56	9.404	0.02348	0.08878
10 3/4	65.7	HCL-80	8640	1236		1716	1519	0.595	9.56	9.404	0.02348	0.08878
10 3/4	65.7	N-80	6300	1096		1600	1519	0.595	9.56	9.404	0.02348	0.08878
10 3/4	65.7	HCN-80	8640	1249		1716	1519	0.595	9.56	9.404	0.02348	0.08878
10 3/4	65.7	C-90	6760	1198		1677	1708	0.595	9.56	9.404	0.02348	0.08878
10 3/4	65.7	H2S-90	8640	1249		1716	1708	0.595	9.56	9.404	0.02348	0.08878
10 3/4	65.7	S-95	8640	1277		1814	1803	0.595	9.56	9.404	0.02348	0.08878
10 3/4	65.7	T-95	6960	1263		1765	1803	0.595	9.56	9.404	0.02348	0.08878
10 3/4	65.7	H2S-95	8640	1263		1765	1803	0.595	9.56	9.404	0.02348	0.08878
10 3/4	65.7	HCP-110	8640	1472		2077	2088	0.595	9.56	9.404	0.02348	0.08878
10 3/4	65.7	P-110	7500	1472		2077	2088	0.595	9.56	9.404	0.02348	0.08878
10 3/4	65.7	HCQ-125	8640	1653		2291	2373	0.595	9.56	9.404	0.02348	0.08878
10 3/4	65.7	Q-125	7920	1653		2291	2373	0.595	9.56	9.404	0.02348	0.08878
10 3/4	65.7	LS-140	8640	1848		2554	2657	0.595	9.56	9.404	0.02348	0.08878
10 3/4	65.7	V-150	8320	1978		2730	2847	0.595	9.56	9.404	0.02348	0.08878
10 3/4	71.1	H2S-90	9300	1317		1822	1856	0.65	9.45	9.294	0.02551	0.08675
10 3/4	71.1	S-95	9600	1403		1971	1959	0.65	9.45	9.294	0.02551	0.08675
10 3/4	71.1	H2S-95	9600	1388		1918	1959	0.65	9.45	9.294	0.02551	0.08675
10 3/4	71.1	HCP-110	9600	1618		2257	2269	0.65	9.45	9.294	0.02551	0.08675
10 3/4	71.1	P-110	9300	1618		2257	2269	0.65	9.45	9.294	0.02551	0.08675
10 3/4	71.1	Q-125	9990	1817		2489	2578	0.65	9.45	9.294	0.02551	0.08675
10 3/4	71.1	LS-140	10570	2031		2775	2888	0.65	9.45	9.294	0.02551	0.08675
10 3/4	71.1	V-150	10880	2174		2966	3094	0.65	9.45	9.294	0.02551	0.08675
10 3/4	73.2	C-90	8760				1915	0.672	9.406	9.25	0.02632	0.08595
10 3/4	73.2	T-95	9090				2021	0.672	9.406	9.25	0.02632	0.08595
10 3/4	79.2	C-90	10370				2079	0.734	9.282	9.126	0.02857	0.08369
10 3/4	79.2	T-95	10800				2194	0.734	9.282	9.126	0.02857	0.08369
10 3/4	85.3	C-90	12010				2243	0.797	9.156	9	0.03082	0.08144

10 3/4	85.3	T-95	12540				2367	0.797	9.156	9	0.03082	0.08144

Table 16 10 3/4" Casing Data

4.3.15. 11 ¾" Casing Data

O.D. (inch)	Nominal Weight T & C lbs/ft	Grade	Collapse Pressure (psi)	Joint Strength 1000 lbs			Body Yield 1000 lbs	Wall (inch)	I.D. (inch)	Drift Diameter (inch)	Displacement (bbl/ft)	Capacity (bbl/ft)
				STC	LTC	BTC						
11 3/4	42	H-40	1040	307		554	478	0.333	11.084	10.928	0.01477	0.11935
11 3/4	47	J-55	1510	477		807	737	0.375	11	10.844	0.01658	0.11754
11 3/4	47	K-55	1510	509		935	737	0.375	11	10.844	0.01658	0.11754
11 3/4	47	HCK-55	2000	638		1054	737	0.375	11	10.844	0.01658	0.11754
11 3/4	47	LS-65	1590	557		931	817	0.375	11	10.844	0.01658	0.11754
11 3/4	54	J-55	2070	568		931	850	0.435	10.88	10.724	0.01913	0.11499
11 3/4	54	K-55	2070	606		1079	850	0.435	10.88	10.724	0.01913	0.11499
11 3/4	54	HCK-55	3100	760		1216	850	0.435	10.88	10.724	0.01913	0.11499
11 3/4	54	LS-65	2250	665		1074	1005	0.435	10.88	10.724	0.01913	0.11499
11 3/4	60	J-55	2660	649		1042	952	0.489	10.772	10.616	0.02140	0.11272
11 3/4	60	K-55	2660	693		1208	952	0.489	10.772	10.616	0.02140	0.11272
11 3/4	60	HCK-55	4360	869		1361	952	0.489	10.772	10.616	0.02140	0.11272
11 3/4	60	LS-65	2840	759		1201	1125	0.489	10.772	10.616	0.02140	0.11272
11 3/4	60	L-80	3180	913		1399	1384	0.489	10.772	10.616	0.02140	0.11272
11 3/4	60	HCL-80	4410	1055		1555	1384	0.489	10.772	10.616	0.02140	0.11272
11 3/4	60	N-80	3180	924		1440	1384	0.489	10.772	10.616	0.02140	0.11272
11 3/4	60	HCN-80	4410	1055		1555	1384	0.489	10.772	10.616	0.02140	0.11272
11 3/4	60	C-90	3360	1011		1517	1557	0.489	10.772	10.616	0.02140	0.11272
11 3/4	60	H2S-90	4410	1055		1555	1557	0.489	10.772	10.616	0.02140	0.11272
11 3/4	60	S-95	4410	1077		1638	1644	0.489	10.772	10.616	0.02140	0.11272
11 3/4	60	T-95	3440	1066		1596	1644	0.489	10.772	10.616	0.02140	0.11272
11 3/4	60	H2S-95	4410	1066		1596	1644	0.489	10.772	10.616	0.02140	0.11272

11 3/4	60	C-95	3440	1066		1596	1644	0.489	10.772	10.616	0.02140	0.11272
11 3/4	60	HCP-110	4410	1242		1877	1903	0.489	10.772	10.616	0.02140	0.11272
11 3/4	60	P-110	3610	1242		1877	1903	0.489	10.772	10.616	0.02140	0.11272
11 3/4	60	HCQ-125	4410	1396		2074	2163	0.489	10.772	10.616	0.02140	0.11272
11 3/4	60	Q-125	3680	1396		2074	2163	0.489	10.772	10.616	0.02140	0.11272
11 3/4	65	LS-65	3580	837		1307	1223	0.534	10.682	10.526	0.02327	0.11085
11 3/4	65	L-80	3870	1007		1521	1505	0.534	10.682	10.526	0.02327	0.11085
11 3/4	65	HCL-80	5740	1152		1691	1505	0.534	10.682	10.526	0.02327	0.11085
11 3/4	65	N-80	3870	1019		1566	1505	0.534	10.682	10.526	0.02327	0.11085
11 3/4	65	HCN-80	5740	1164		1691	1505	0.534	10.682	10.526	0.02327	0.11085
11 3/4	65	H2S-90	5140	1164		1691	1639	0.534	10.682	10.526	0.02327	0.11085
11 3/4	65	S-95	5740	1189		1781	1788	0.534	10.682	10.526	0.02327	0.11085
11 3/4	65	H2S-95	5740	1177		1736	1788	0.534	10.682	10.526	0.02327	0.11085
11 3/4	65	HCP-110	5740	1371		2041	2070	0.534	10.682	10.526	0.02327	0.11085
11 3/4	65	P-110	4480	1371		2041	2070	0.534	10.682	10.526	0.02327	0.11085
11 3/4	65	HCQ-125	5740	1540		2256	2352	0.534	10.682	10.526	0.02327	0.11085
11 3/4	65	Q-125	4690	1540		2256	2352	0.534	10.682	10.526	0.02327	0.11085
11 3/4	65	LS-140	5740	1722		2516	2634	0.534	10.682	10.526	0.02327	0.11085
11 3/4	71	H2S-90	7280	1226		1790	1838	0.582	10.586	10.43	0.02526	0.10886
11 3/4	71	S-95	7280	1306		1933	1940	0.582	10.586	10.43	0.02526	0.10886
11 3/4	71	H2S-95	7280	1293		1884	1940	0.582	10.586	10.43	0.02526	0.10886
11 3/4	71	HCP-110	7280	1506		2215	2246	0.582	10.586	10.43	0.02526	0.10886
11 3/4	71	HCQ-125	7280	1693		2448	2552	0.582	10.586	10.43	0.02526	0.10886
11 3/4	71	Q-125	5760	1693		2448	2552	0.582	10.586	10.43	0.02526	0.10886

Table 17 11 3/4" Casing Data

4.3.16. 11 7/8” Casing Data

O.D. (inch)	Nominal Weight T & C lbs/ft	Grade	Collapse Pressure (psi)	Joint Strength 1000 lbs			Body Yield 1000 lbs	Wall (inch)	I.D. (inch)	Drift Diameter (inch)	Displacement (bbl/ft)	Capacity (bbl/ft)
				STC	LTC	BTC						
11 7/8	71.8	H2S-90	7190	1129		1647	1858	0.582	10.711		0.02554	0.11145
11 7/8	71.8	S-95	7190	1153		1735	1962	0.582	10.711		0.02554	0.11145
11 7/8	71.8	H2S-95	7190	1141		1691	1962	0.582	10.711		0.02554	0.11145
11 7/8	71.8	HCP-110	7190	1329		1988	2271	0.582	10.711		0.02554	0.11145
11 7/8	71.8	P-110	5290	1329		1988	2271	0.582	10.711		0.02554	0.11145
11 7/8	71.8	HCQ-125	7190	1494		2198	2581	0.582	10.711		0.02554	0.11145
11 7/8	71.8	Q-125	5630	1494		2198	2581	0.582	10.711		0.02554	0.11145
11 7/8	71	LS-140	7280	1893		2730	2859	0.582	10.586	10.43	0.02813	0.10886
11 7/8	71.8	LS-140	7190	1671		2451	2891	0.582	10.711		0.02554	0.11145

Table 18 11 7/8" Casing Data

4.3.17. 13 3/8” Casing Data

O.D. (inch)	Nominal Weight T & C lbs/ft	Grade	Collapse Pressure (psi)	Joint Strength 1000 lbs			Body Yield 1000 lbs	Wall (inch)	I.D. (inch)	Drift Diameter (inch)	Displacement (bbl/ft)	Capacity (bbl/ft)
				STC	LTC	BTC						
13 3/8	48	H-40	740	322		607	541	0.33	12.715	12.559	0.01673	0.15705
13 3/8	54.5	J-55	1130	514		909	853	0.38	12.615	12.459	0.01919	0.15459
13 3/8	54.5	K-55	1130	547		1038	853	0.38	12.615	12.459	0.01919	0.15459
13 3/8	54.5	HCK-55	1400	689		1194	853	0.38	12.615	12.459	0.01919	0.15459
13 3/8	54.5	LS-65	1140	602		1052	1008	0.38	12.615	12.459	0.01919	0.15459
13 3/8	61	J-55	1540	595		1025	962	0.43	12.515	12.359	0.02163	0.15215
13 3/8	61	K-55	1540	633		1169	962	0.43	12.515	12.359	0.02163	0.15215
13 3/8	61	HCK-55	2040	798		1345	962	0.43	12.515	12.359	0.02163	0.15215
13 3/8	61	LS-65	1620	697		1185	1137	0.43	12.515	12.359	0.02163	0.15215
13 3/8	68	J-55	1950	675		1140	1069	0.48	12.415	12.259	0.02405	0.14973
13 3/8	68	K-55	1950	718		1300	1069	0.48	12.415	12.259	0.02405	0.14973
13 3/8	68	HCK-55	2850	905		1496	1069	0.48	12.415	12.259	0.02405	0.14973
13 3/8	68	LS-65	2110	791		1318	1264	0.48	12.415	12.259	0.02405	0.14973
13 3/8	68	L-80	2260	952		1545	1556	0.48	12.415	12.259	0.02405	0.14973
13 3/8	68	HCL-80	2910	1093		1732	1556	0.48	12.415	12.259	0.02405	0.14973
13 3/8	68	N-80	2260	963		1585	1556	0.48	12.415	12.259	0.02405	0.14973
13 3/8	68	HCN-80	2910	1103		1732	1556	0.48	12.415	12.259	0.02405	0.14973
13 3/8	68	C-90	2320	1057		1683	1750	0.48	12.415	12.259	0.02405	0.14973
13 3/8	68	S-95	2910	1125		1812	1847	0.48	12.415	12.259	0.02405	0.14973
13 3/8	68	T-95	2330	1114		1772	1847	0.48	12.415	12.259	0.02405	0.14973
13 3/8	68	C-95	2330	1114		1772	1847	0.48	12.415	12.259	0.02405	0.14973
13 3/8	68	HCP-110	2910	1297		2079	2139	0.48	12.415	12.259	0.02405	0.14973
13 3/8	68	P-110	2340	1297		2079	2139	0.48	12.415	12.259	0.02405	0.14973
13 3/8	72	LS-65	2430	854		1408	1350	0.514	12.347	12.191	0.02569	0.14809
13 3/8	72	L-80	2670	1029		1650	1661	0.514	12.347	12.191	0.02569	0.14809
13 3/8	72	HCL-80	3470	1181		1850	1661	0.514	12.347	12.191	0.02569	0.14809
13 3/8	72	N-80	2670	1040		1693	1661	0.514	12.347	12.191	0.02569	0.14809

13 3/8	72	HCN-80	3470	1192		1850	1661	0.514	12.347	12.191	0.02569	0.14809
13 3/8	72	C-90	2780	1142		1798	1869	0.514	12.347	12.191	0.02569	0.14809
13 3/8	72	H2S-90	3470	1192		1850	1869	0.514	12.347	12.191	0.02569	0.14809
13 3/8	72	S-95	3470	1215		1935	1973	0.514	12.347	12.191	0.02569	0.14809
13 3/8	72	T-95	2820	1204		1893	1973	0.514	12.347	12.191	0.02569	0.14809
13 3/8	72	H2S-95	3470	1204		1893	1973	0.514	12.347	12.191	0.02569	0.14809
13 3/8	72	C-95	2820	1204		1893	1973	0.514	12.347	12.191	0.02569	0.14809
13 3/8	72	HCP-110	3470	1402		2221	2284	0.514	12.347	12.191	0.02569	0.14809
13 3/8	72	P-110	2890	1402		2221	2284	0.514	12.347	12.191	0.02569	0.14809
13 3/8	72	HCQ-125	3470	1577		2463	2596	0.514	12.347	12.191	0.02569	0.14809
13 3/8	72	Q-125	2880	1577		2463	2596	0.514	12.347	12.191	0.02569	0.14809
13 3/8	72	LS-140	3470	1763		2749	2908	0.514	12.347	12.191	0.02569	0.14809
13 3/8	72	V-150	2880	1887		2939	3115	0.514	12.347	12.191	0.02569	0.14809
13 3/8	80.7	H2S-90	4990			2077	2098	0.58	12.215	12.059	0.02884	0.14494
13 3/8	80.7	S-95	4990			2173	2215	0.58	12.215	12.059	0.02884	0.14494
13 3/8	80.7	H2S-95	4990			2125	2215	0.58	12.215	12.059	0.02884	0.14494
13 3/8	80.7	HCP-110	4990			2493	2565	0.58	12.215	12.059	0.02884	0.14494
13 3/8	80.7	P-110	4000			2493	2565	0.58	12.215	12.059	0.02884	0.14494
13 3/8	80.7	HCQ-125	4990			2765	2914	0.58	12.215	12.059	0.02884	0.14494
13 3/8	80.7	Q-125	4140			2765	2914	0.58	12.215	12.059	0.02884	0.14494
13 3/8	86	S-95	6240			2333	2378	0.625	12.125	11.969	0.03096	0.14282
13 3/8	86	HCP-110	6240			2677	2754	0.625	12.125	11.969	0.03096	0.14282
13 3/8	86	P-110	4780			2677	2754	0.625	12.125	11.969	0.03096	0.14282
13 3/8	86	HCQ-125	6240			2969	3129	0.625	12.125	11.969	0.03096	0.14282
13 3/8	86	Q-125	5030			2969	3129	0.625	12.125	11.969	0.03096	0.14282

Table 19 13 3/8" Casing Data

4.3.18. 13 ½” & 13 5/8” Casing Data

O.D. (inch)	Nominal Weight T & C lbs/ft	Grade	Collapse Pressure (psi)	Joint Strength 1000 lbs			Body Yield 1000 lbs	Wall (inch)	I.D. (inch)	Drift Diameter (inch)	Displacement (bbl/ft)	Capacity (bbl/ft)
				STC	LTC	BTC						
13 1/2	81.4	H2S-90	4860			1862	2119	0.58	12.34		0.02912	0.14793
13 1/2	81.4	S-95	4860			1948	2236	0.58	12.34		0.02912	0.14793
13 1/2	81.4	H2S-95	4860			1905	2236	0.58	12.34		0.02912	0.14793
13 1/2	81.4	HCP-110	4860			2235	2590	0.58	12.34		0.02912	0.14793
13 1/2	81.4	P-110	3910			2235	2590	0.58	12.34		0.02912	0.14793
13 1/2	81.4	HCQ-125	4860			2479	2943	0.58	12.34		0.02912	0.14793
13 1/2	81.4	Q-125	4030			2479	2943	0.58	12.34		0.02912	0.14793
13 5/8	88.2	H2S-90	5930			1801	2297	0.625	12.375		0.03157	0.14877
13 5/8	88.2	S-95	5930			1885	2425	0.625	12.375		0.03157	0.14877
13 5/8	88.2	H2S-95	5930			1843	2425	0.625	12.375		0.03157	0.14877
13 5/8	88.2	HCP-110	5930			2163	2808	0.625	12.375		0.03157	0.14877
13 5/8	88.2	P-110	4570			2163	2808	0.625	12.375		0.03157	0.14877
13 5/8	88.2	HCQ-125	5930			2399	3191	0.625	12.375		0.03157	0.14877
13 5/8	88.2	Q-125	4800			2399	3191	0.625	12.375		0.03157	0.14877

Table 20 13 1/2" & 13 5/8" Casing Data

4.3.19. 16” Casing Data

O.D. (inch)	Nominal Weight T & C lbs/ft	Grade	Collapse Pressure (psi)	Joint Strength 1000 lbs			Body Yield 1000 lbs	Wall (inch)	I.D. (inch)	Drift Diameter (inch)	Displacement (bbl/ft)	Capacity (bbl/ft)
				STC	LTC	BTC						
16	65	H-40	630	439		781	736	0.375	15.25	15.062	0.02277	0.22592
16	75	J-55	1020	710		1200	1178	0.438	15.124	14.936	0.02649	0.22220
16	75	K-55	1020	752		1331	1178	0.438	15.124	14.936	0.02649	0.22220
16	75	LS-65	1020	832		1394	1392	0.438	15.124	14.936	0.02649	0.22220
16	84	J-55	1410	817		1351	1326	0.495	15.01	14.822	0.02982	0.21887
16	84	K-55	1410	865		1499	1326	0.495	15.01	14.822	0.02982	0.21887
16	84	LS-65	1470	957		1570	1567	0.495	15.01	14.822	0.02982	0.21887
16	84	N-80	1480	1167		1898	1929	0.495	15.01	14.822	0.02982	0.21887
16	84	HCN-80	1910	1342		1898	1929	0.495	15.01	14.822	0.02982	0.21887
16	84	HCP-110	1910	1575		2518	2652	0.495	15.01	14.822	0.02982	0.21887
16	84	P-110	1480	1575		2518	2652	0.495	15.01	14.822	0.02982	0.21887
16	84	HCQ-125	1910	1773		2809	3014	0.495	15.01	14.822	0.02982	0.21887
16	84	Q-125	1480	1773		2809	3014	0.495	15.01	14.822	0.02982	0.21887
16	95	N-80	2180			2161	2196	0.566	14.868		0.03394	0.21474
16	95	HCN-80	2580			2161	2196	0.566	14.868		0.03394	0.21474
16	95	HCP-110	2580			2866	3019	0.566	14.868		0.03394	0.21474
16	95	P-110	2230			2866	3019	0.566	14.868		0.03394	0.21474
16	95	HCQ-125	2580			3198	3431	0.566	14.868		0.03394	0.21474
16	95	Q-125	2230			3198	3431	0.566	14.868		0.03394	0.21474
16	97	N-80	2270			2194	2230	0.575	14.85		0.03446	0.21422
16	97	HCN-80	2990			2194	2230	0.575	14.85		0.03446	0.21422
16	97	HCP-110	2990			2910	3067	0.575	14.85		0.03446	0.21422
16	97	P-110	2340			2910	3067	0.575	14.85		0.03446	0.21422
16	97	HCQ-125	2990			3246	3485	0.575	14.85		0.03446	0.21422
16	97	Q-125	2340			3246	3485	0.575	14.85		0.03446	0.21422
16	109	J-55	2560	1116		1772	1739	0.656	14.688	14.5	0.03911	0.20958
16	109	K-55	2560	1181		1965	1739	0.656	14.688	14.5	0.03911	0.20958

16	109	N-80	3080	1594		2489	1739	0.656	14.688	14.5	0.03911	0.20958
16	118	J-55	3170	1224		1924	1889	0.715	14.57	14.382	0.04247	0.20622
16	118	K-55	3170	1296		2131	1889	0.715	14.57	14.382	0.04247	0.20622
16	118	N-80	3680	1741		2703	2747	0.715	14.57	14.382	0.04247	0.20622

Table 21 16" Casing Data

4.3.20. 18 5/8" & 20" Casing Data

O.D. (inch)	Nominal Weight T & C lbs/ft	Grade	Collapse Pressure (psi)	Joint Strength 1000 lbs			Body Yield 1000 lbs	Wall (inch)	I.D. (inch)	Drift Diameter (inch)	Displacement (bbl/ft)	Capacity (bbl/ft)
				STC	LTC	BTC						
18 5/8	87.5	H-40	630	559		993	995	0.435	17.755	17.567	0.03075	0.30624
18 5/8	87.5	J-55	630	754		1329	1368	0.435	17.755	17.567	0.03075	0.30624
18 5/8	87.5	K-55	630	794		1427	1368	0.435	17.755	17.567	0.03075	0.30624
18 5/8	87.5	N-80	630	1079		1887	1990	0.435	17.755	17.567	0.03075	0.30624
18 5/8	94.5	H-40	780	609		1067	1068	0.468	17.689	17.501	0.03302	0.30396
18 5/8	94.5	J-55	780	821		1427	1469	0.468	17.689	17.501	0.03302	0.30396
18 5/8	94.5	K-55	780	865		1533	1469	0.468	17.689	17.501	0.03302	0.30396
18 5/8	94.5	N-80	780	1174		2027	2137	0.468	17.689	17.501	0.03302	0.30396
18 5/8	106	H-40	1140	703		1206	1208	0.531	17.563	17.375	0.03733	0.29965
18 5/8	106	J-55	1140	948		1613	1661	0.531	17.563	17.375	0.03733	0.29965
18 5/8	106	K-55	1140	998		1733	1661	0.531	17.563	17.375	0.03733	0.29965
18 5/8	106	N-80	1150	1356		2292	2416	0.531	17.563	17.375	0.03733	0.29965
18 5/8	117.5	H-40	1500	795		1342	1344	0.593	17.439	17.251	0.04155	0.29543
18 5/8	117.5	J-55	1510	1072		1795	1849	0.593	17.439	17.251	0.04155	0.29543
18 5/8	117.5	K-55	1510	1129		1929	1849	0.593	17.439	17.251	0.04155	0.29543
18 5/8	117.5	N-80	1620	1534		2551	2689	0.593	17.439	17.251	0.04155	0.29543
20	94	H-40	520	581		1041	1077	0.438	19.124	18.936	0.03329	0.35528

20	94	J-55	520	783	907	1402	1480	0.438	19.124	18.936	0.03329	0.35528
20	94	K-55	520	824	955	1479	1480	0.438	19.124	18.936	0.03329	0.35528
20	106.5	J-55	770	913	1056	1595	1685	0.5	19	18.812	0.03789	0.35069
20	106.5	K-55	770	960	1113	1683	1685	0.5	19	18.812	0.03789	0.35069
20	106.5	N-80	770	1307	1514	2281	2450	0.5	19	18.812	0.03789	0.35069
20	133	K-55	1500	1253	1453	2123	2125	0.635	18.73	18.542	0.04778	0.34079
20	133	L-80	1600	1692	1958	2849	3091	0.635	18.73	18.542	0.04778	0.34079
20	133	N-80	1600	1707	1976	2877	3091	0.635	18.73	18.542	0.04778	0.34079
20	169	K-55	2500	1402	1732	2689	2692	0.812	18.376	18.188	0.06054	0.32803
20	169	L-80	3020	2202	2549	3610	3916	0.812	18.376	18.188	0.06054	0.32803
20	169	N-80	3020	2221	2573	3645	3916	0.812	18.376	18.188	0.06054	0.32803

Table 22 18 5/8" & 20" Casing Data

5. Production

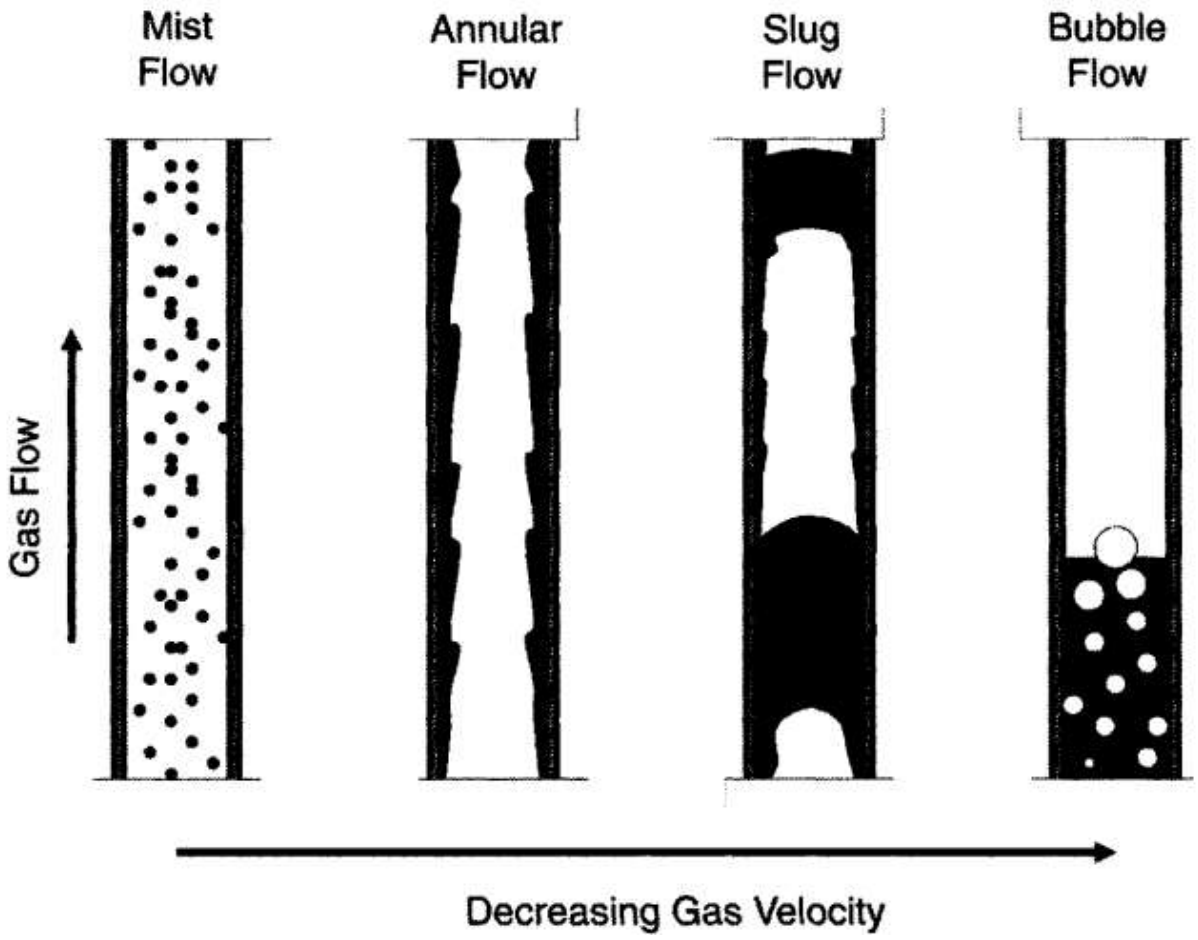

Figure 14 Flow Regimes (Ghalamboor and Guo 2005)

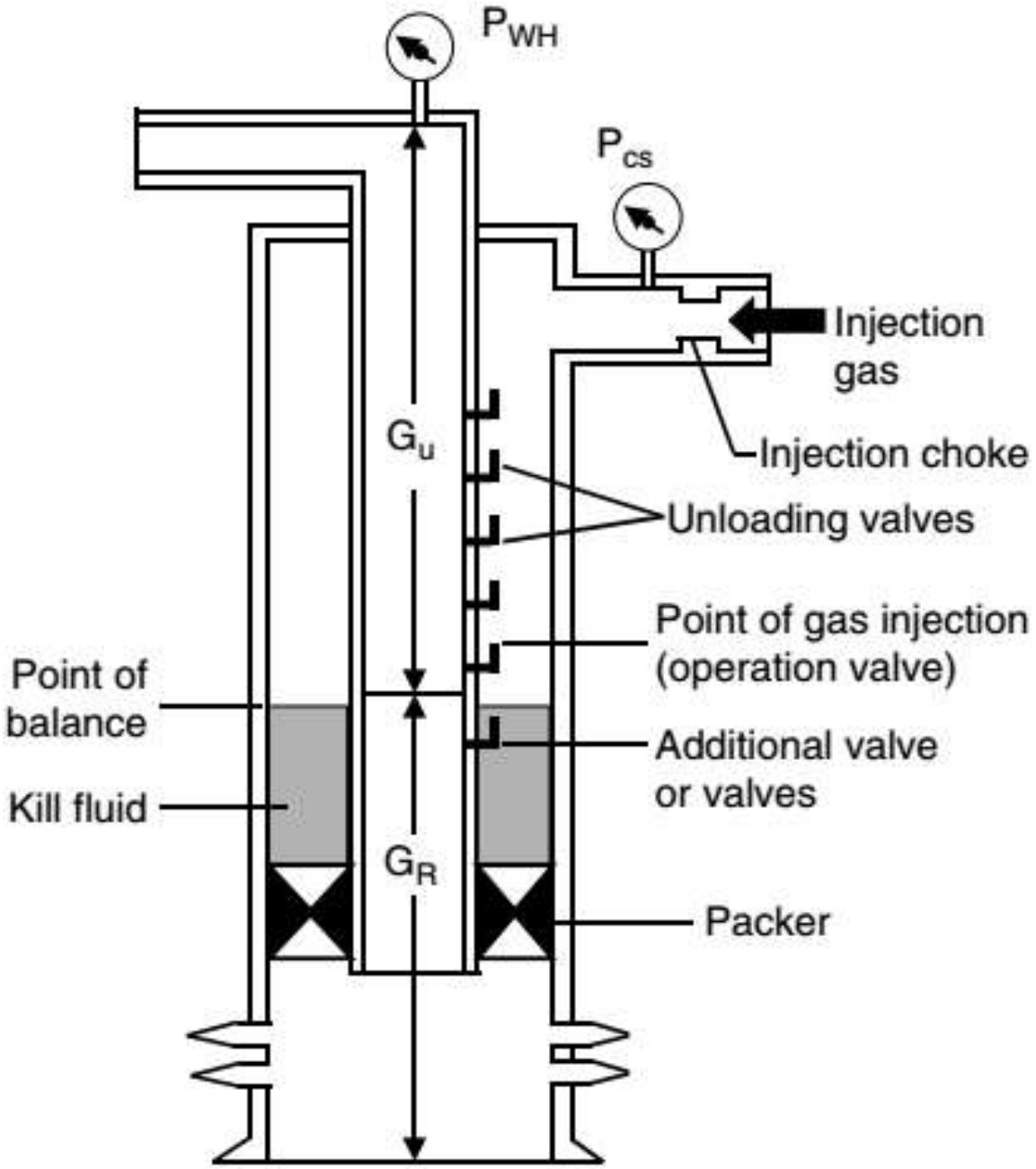

Figure 15 Gas Lift Diagram (Guo, Lyons and Ghalambor 2007)

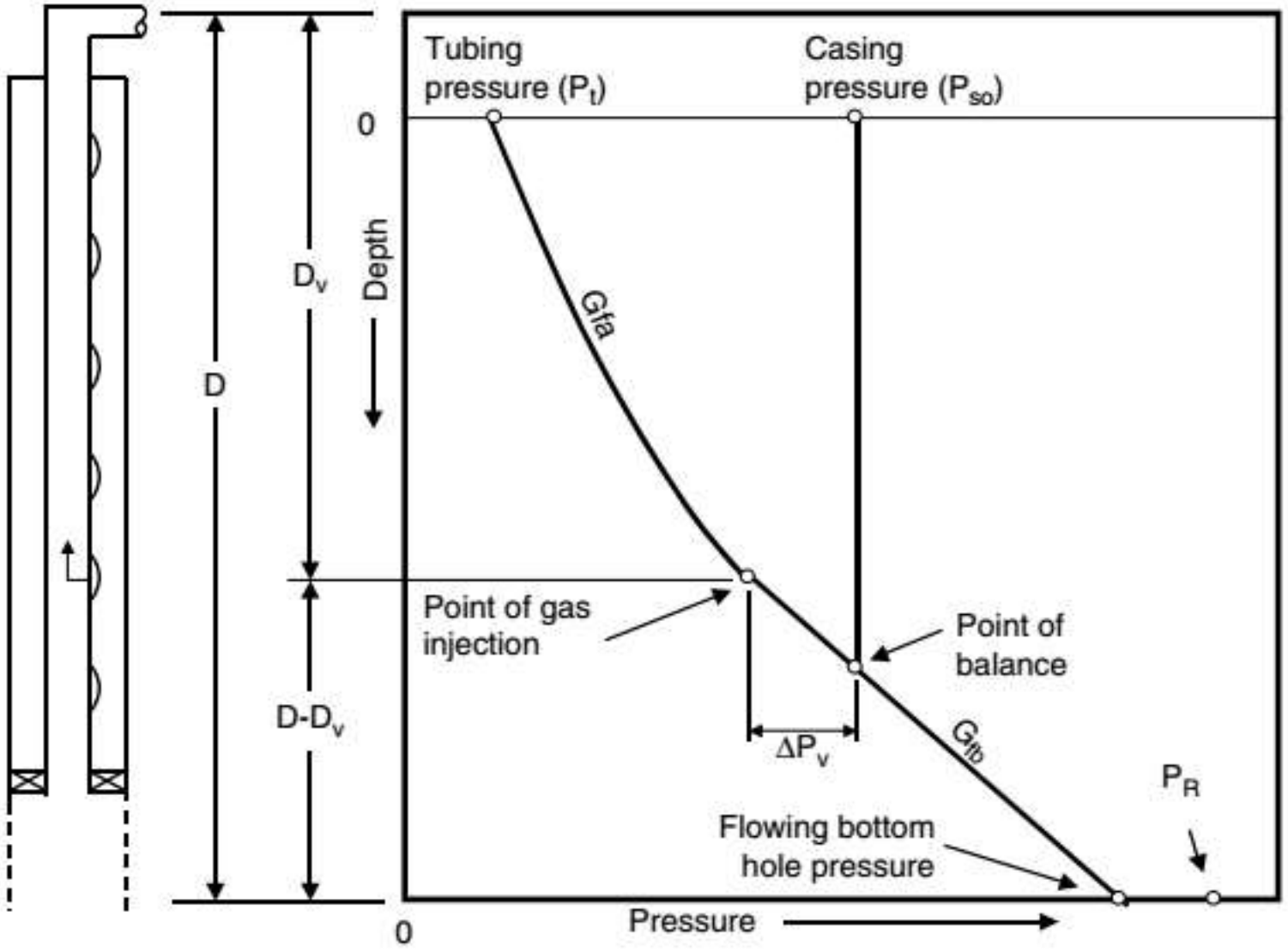

Figure 16 Gas Lift Pressure Relationship (Guo, Lyons and Ghalambor 2007)

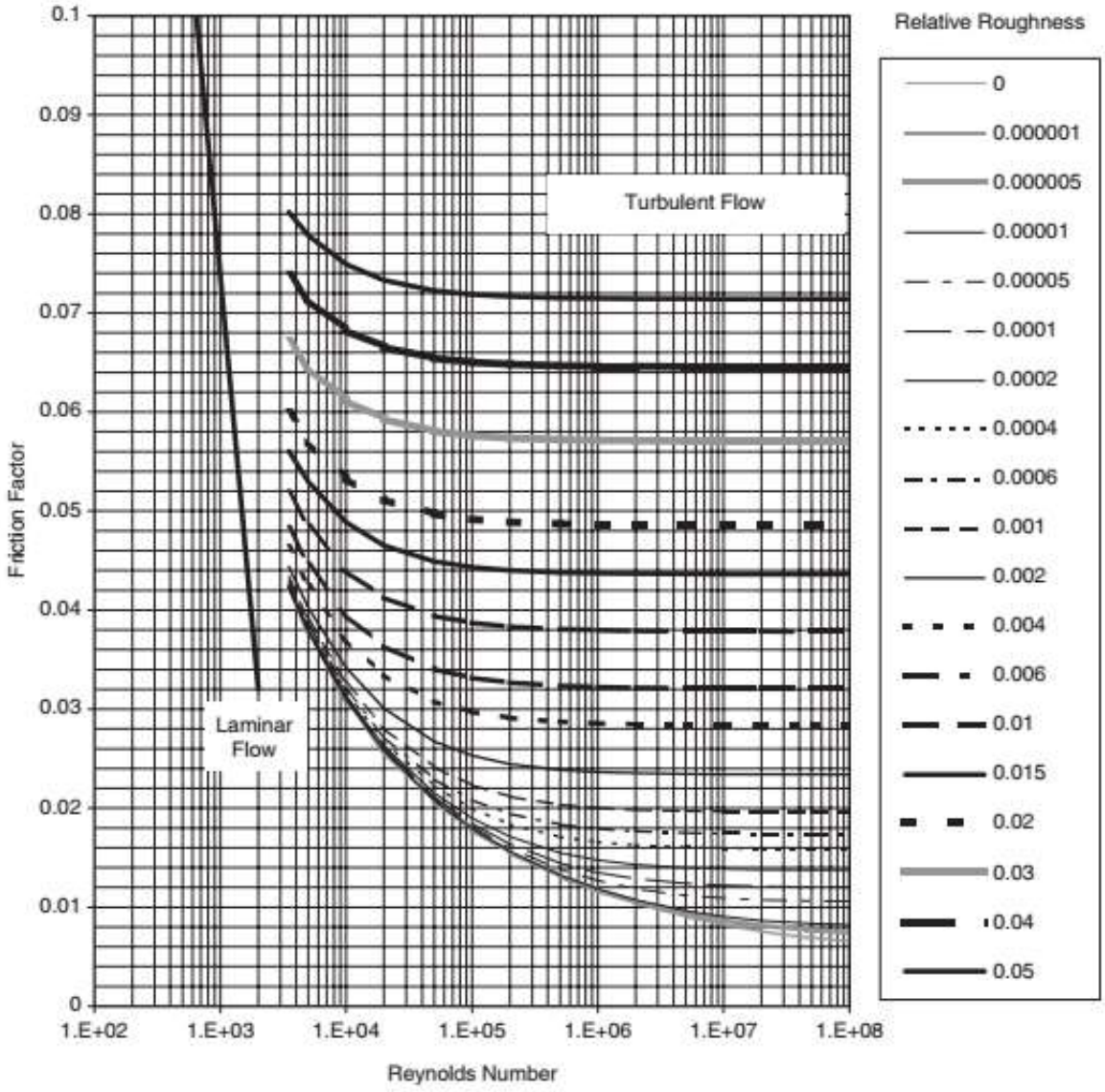

Figure 17 Darcy-Weisbach friction factor chart (Guo, Lyons and Ghalambor 2007)

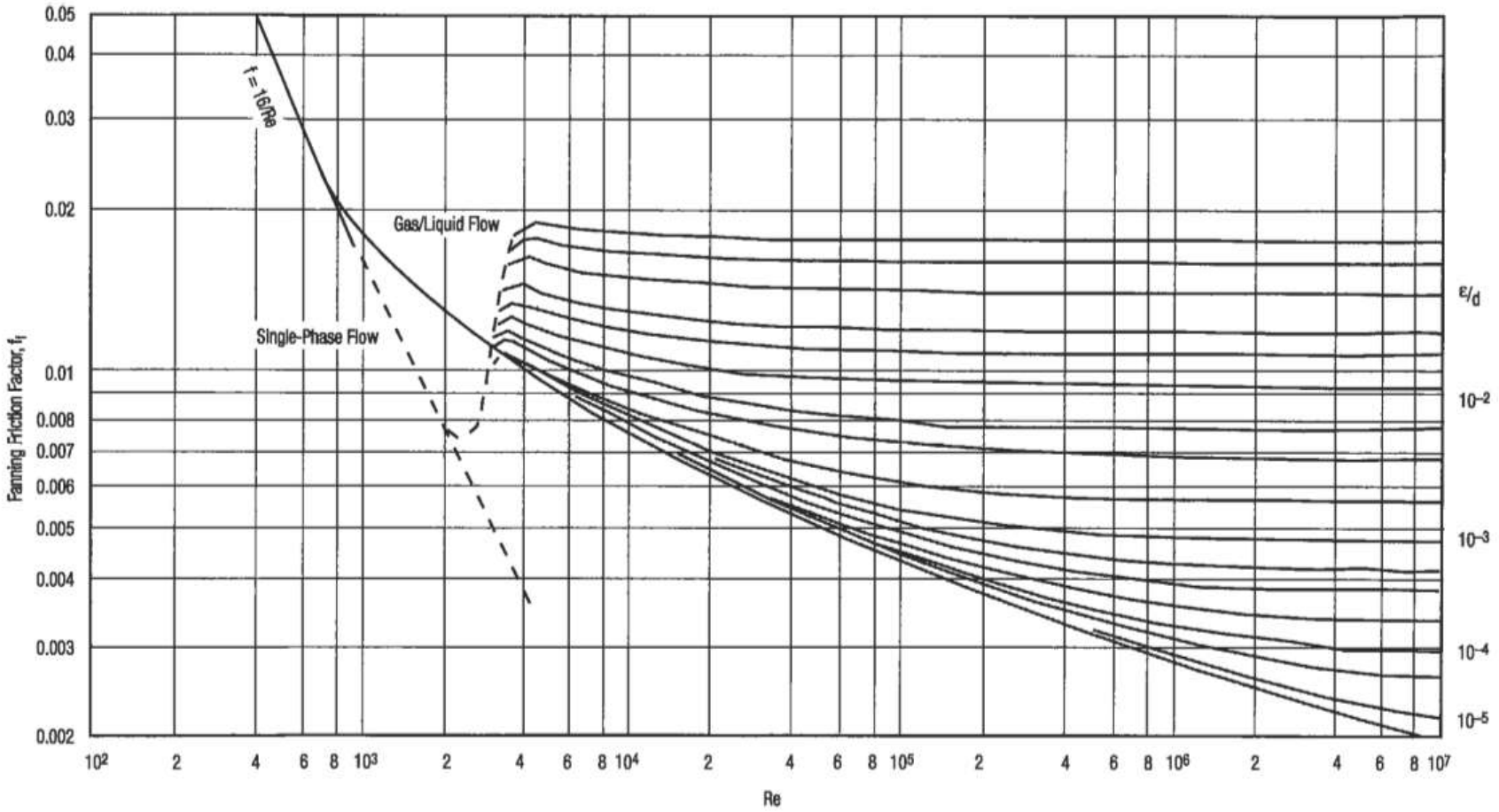

Figure 18 Fanning Friction Factor (Lyons 1996)

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