OIL TANK
TABLES

How to
Calculate
Them . . . .

SQUIRE

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How To Calculate Them

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Oil Company

PRICE 50 CENTS

TO the men of intelligence, enterprise and pluck, who during the last half century have built up a vast industry in the production, transportation and utilization of petroleum, this little book is respectfully dedicated. . . .

INTRODUCTION

The author was, for many years, employed by the pipe line department of the Standard Oil Company, much of the time in the oil fields, and became well acquainted with the system of handling oil from well to refinery. He believes that a very large proportion of the buyers and sellers of crude oil will welcome a simple and accurate method of calculating the capacities of so-called "taper" tanks; that is, tanks in which the diameters decrease from the bottom up. The buying and selling of crude petroleum his grown to be a vast business. A very large proportion of this buying and selling is based upon the measurements made in these "taper" tanks. This little book will enable any one who can accurately use the four simple rules of arithmetic to compute tank tables. The author has given much thought to the devising of a system of checks, which will enable the faithful computer to avoid, or detect, errors in his work. He has also taken great care to see that no errors have crept into the tables given in this book, all of which are original. In computing the principal table (Table 3) herein given, the work was carried to five places of decimals. Absolute dependence may be placed upon its accuracy.

EDWIN SQUIRE.

Claremont, California, 1909.

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How to "Strap" a Taper Tank and How to Calculate a Tank Table

With a gauge pole, graduated to feet and inches, and fractions of inches, measure the slant depth of the tank inside. Next drive a nail in back of gauge pole, so that when the pole hangs on outside of tank, with the nail resting on top of stave, the bottom of pole will come just to level of bottom of tank (inside). It is necessary to get the circumference of the tank at 0'-6" and at 1'-6", 2'-6", 3'-6", etc. It is usually sufficient to measure the circumference only at every two feet, and interpolate the other circumference measurements. Now with the gauge pole suspended as noted above, observe at what points it is practicable to measure circumferences. In many instances it will be necessary to make the actual measurements a few inches above or below the regular "working" points—and afterwards calculate the circumferences at the regular points. When you have fixed upon the points where you will measure, drive nails at each of such points. Four or more vertical rows of nails should be thus driven at about equal distances apart around the tank; the use of nails being to keep the tape line horizontal while measuring around the tank. If the tank is clean on the outside and not too large chalk marks may take the place of the rows of nails. Next hook the ring of the steel tape line over a nail at 0'-6" above bottom of tank, and then carry the tape around the tank at the same level. Make sure that the tape line is horizontal, and tight, then note the circumference in feet and hundredths. Next raise the tape to 2'-6" and note the measurement as before, and so on to the top; taking a measurement at every two feet if practicable. It is desirable to have measurements taken at intervals not exceeding two feet, because the taper is often somewhat irregular. Next note the thickness of the staves measuring enough of them so as to get a fair average of the whole. Next note any "deadwood," such as timbers or pipes inside the tank, which will reduce its capacity. Beginning at the bottom note deadwood thus:

0'-0" to 0'-2"＝4 Pcs. 2"x12"x12" flat.

0'-2" to top＝4 Pcs. 4"x4"x9'-4", upright, (posts).

9'-0" to 9'-6"＝60 lineal feet 1"x6", on edge.

Now we are ready for the office work. Make a table similar to that shown in Example 1, showing in column 2 the outside circumferences at all the regular points, and leaving spaces for circumferences at 1'-6", 3'-6", 5'-6", etc. Next write in column 3, the inside circumferences, corrected for slope, as well as for thickness of staves. To find correction for thickness of staves, multiply thickness of staves in inches by 0.5236, or use Table 5, which gives quantity in feet to be subtracted from outside circumference. For staves 1⅞" thick, the correction is 0.98 foot. Table 2 shows corrections for slope of staves.

As the circumference of the tank whose measurements are given in Example 1, decrease at the rate of 0.50 foot, for each foot of height, we look in column 1, of Table 2, for 0.50, and find there is a correction of 0.01 foot for all circumferences between 3'-2" and 9'-6" of height, so we subtract 0.98' from outside circumferences at 0'-6" and 2'-6", and subtract 0.99' from all circumferences above 3'-2" up to 9'-6", which is the full height of the tank with which we are dealing. Next we find by interpolation the inside circumferences at 1'-6", 3'-6", 5'-6", etc., writing them in column 3. Next we find from Table 3, the capacities in barrels per foot for each circumference shown in column 3, Example 1, writing the results in column 4. Next divide the quantities in column 4, by

12, writing the quotients in column 5. Next take the differences be:ween contiguous quantities in column 5, writing these differences as shown in column 6. Next, on a separate sheet of paper, write the differences between continuous numbers of column 3, and compare each of these with the corresponding number in column 6. The ratios should be nearly the same in the same tank. This is a good check. Next divide each of these differences by 12, writing the quotient i n column 7. Next estimate the deadwood, writing results as shown in example. The author has found Table 4 very convenient in estimating deadwood. Next calculate the net capacities by feet as shown in example. Keep this in convenient form for checking work when making calculations by inches, as shown further on. It may be well to make a diagram to estimate capacity of top fraction of a foot. In the Example shown, we find by calculation, the gross capacity at 9'-3"— 70.558 bbls. per foot. The net capacity of the top half foot is therefore, $\frac{70.558}{2}$ —deadwood (0.485) = 34.794 bbls. We are now ready to compute the capacities for each inch. The capacity of first inch, equals the inch capacity at 0'-6" plus 5½ times* the quantity shown in column 7, minus the deadwood, =6.833+ (5½×.007½)—.059,=6.615. Each succeeeding inch is smaller than the next one below it by the quantity shown in column 7, (making the allowances for deadwood). At every foot the work should be checked with the results as shown by the net foot capacities. (See Example). ' It will often be found that corrections of a few thousandths must be made, due to the fact that the quantities added have beeen a few ten thousandths too large, or too small. The corrections should be distributed through the whole foot

If it is desired to make the tank table for every quarter inch, or eighth inch, the inches as above found are first written in, and the fractions afterwards found by interpolation. If it is desired to find capacities of tanks smaller than 15, or larger than 105, feet circumferences, we can still make use of Table 3, by considering that the areas of circles vary as the squares of their circumferences. If we wish, for instance, to find the capacity of a tank whose circumference is 300 feet, we find, from Table 3, the capacity of a tank whose circumference is 100 feet, and multiply by 9. The author has used Table 3, in calculating capacities of reservoirs more than fifteen hundred feet in circumference. If great accuracy is desired in calculating tables for reservoirs which taper as much as one foot change, of circumference, for each foot of depth, the circumferences should be calculated or measured for every half foot of depth, and the corresponding capacities taken from Table 3. Then the quantities in column 6 (See Example 1) should be divided by 6 to obtain quantities in column 7, which represent differences of capacities between contiguous inches. For any wooden tanks with which the author has had to do, the method of taking out the capacities at every foot of height is sufficiently accurate.

*The middle of the bottom inch being 5½ inches below point 0'-6".

EXAMPLE 1

Height	Outside Circumference	Inside correc'd Circumference	Bbls. per foot	Bbls. per inch	Differences of Middle inches	Differences of contiguous ins.	DEADWOOD
0'-6"	75.92	74.94	79.598	6.633			
					.090	.007½	
1'-6"		74.43	78.518	6.543			Botton to 0'-2"—4 Pcs.
					.089	.007 $\frac{5}{12}$	2"x12"x12" flat.
2'-6"	74.90	73.92	77.446	6.454			0'-2" to 9'-6"—4 Pcs.
					.085½	.007⅛	4"x4" upright.
3'-6"		73.43	76.422	6.368½			9'-0" to 9'-6"—60 lineal
					.084½	.007	feet of 1"x6" on edge.
4'-6"	73.93	72.94	75.406	6.284			Bottom to 0'-2"—.059
					.090	.007½	per inch.
5'-6"		72.41½	74.324	6.194			0'-2" to 9'-0"—.0065 per
					.090	.007½	inch.
6'-6"	72.88	71.89	73.250	6.104			9'-0" to 9'-6"—.0808 per
					.082	.006 $\frac{5}{8}$	inch.
7'-6"		71.40½	72.265	6.022			1st foot—0.184 bbls.
					.081	.006¾	2nd, 3d, etc., to 9th foot
8'-6"	71.91	70.92	71.287	5.941			—.079 bbls per foot.
					.081	.006¾	9'-0" to 9'-6"—0.485 bbl.
9'-6"		70.43½	70.315	5.860			

NET CAPACITY

At 1 foot— 79.414*
78.439†
———
" 2 feet —157.853
77.367
———
" 3 " —235.220
76.343
———
" 4 " —311.563
75.327
———
" 5 " —386.890
74.245
———
" 6 " —461.135

At 6 foot—461.135
73.171
———
" 7 " —534.306
72.186
———
" 8 " —606.492
71.208
———
" 9 " —677.700
34.794
———
" 9'-6" —712.494

†—78.518 minus deadwood (0.079).
*—79.598 minus deadwood (0.184).

Depth	Capacity	Depth	Capacity	Depth	Capacity	Depth	Capacity
0'- 1"	6.615 6.608		112.228 6.540		215,975 6.422	8'- 0"	606.492 5.971
2"	13.223 * 6.653	6"	118.768 6.533	10"	222.397 6.415	1"	612.463 5.965
3"	19.876 6.646	7"	125.301 6.525	11"	228.812 6.408	2"	618.428 5.958
4"	26.522 6.638	8"	131.826 6.518	3'- 0"	235.220 6.401	3"	624.386 5.951
5"	33.160 6.630	9"	138.344 6.510	1"	241.621 6.394	4"	630.337 5.944
6"	39.790 6.623	10"	144.854 6.503	2"	248.015 6.387	5"	636.282 5.937
7"	46.413 6.615	11"	151.357 6.496	3"	254.402 6.380	6"	642.219 5.930
8"	53.028 6,608	2'- 0"	157.853 6.488	4"	260.782 6.372	7"	648.150 5.923
9"	59.636 6.600	1"	164.341 6.480	5"	267.154 6.365	8"	654.073 5.916
10"	66.236 6.593	2"	170.821 6.473	6"	273.519 6.358	9"	659.990 5.910
11"	72.829 6.585	3"	177.294 6.466	7"	279.877 6.351	10"	665.900 5.903
1'- 0"	79.414 6.578	4"	183.760 6.458	8"	286.228 6.344	11"	671.804 5.896
1"	85.992 6.570	5"	190.218 6.450	9"	292.572 6.337	9'- 0"	677.700 *5.815
2"	92.562 6.563	6"	196.668 6.433	10"	298.909 6.330	1"	683.516 5.808
3"	99.125 6.555	7"	203.111 6.435	11"	305.239 6.323	2"	689.325 5.801
4"	105.680 6.548	8"	209.546 6.429	4'- 0"	311.563 6.316	3"	695.127 5.795
5'	112.228	9"	215.975	1"	317.879	4"	700.923 5.788
						5"	706.712 5.781
						6"	712.494

*See change of deadwood.

TABLE 2

Correction in hundredths of a foot to be subtracted from circumference. The correction shown at head of column begins at the height shown in same column opposite the given rate of slope, as shown in first column.

Left header: Decrease in Circumference per foot of height

	.01	.02	.03	.04	.05	.06	.07	.08	.09	.10
0.30	14'- 7"									
.31	13'- 2"									
.32	12'- 1"									
.33	11'- 0"									
.34	10'- 0"									
.35	9'- 2"									
.36	8'- 6"									
.37	7'- 9"									
.38	7'- 2"									
.39	6'- 8"									
.40	6'- 2"	18'- 6"								
.41	5'- 9"	17'- 3"								
.42	5'- 4"	16'- 0"								
.43	5'- 0"	15'- 0"								
.44	4'- 8"	14'- 0"								
.45	4'- 4"	13'- 0"								
.46	4'- 1"	12'- 2"								
.47	3'-10"	11'- 5"	19'- 0"							
.48	3'- 7"	10'- 9"	17'-10"							
.49	3'- 4"	10'- 1"	16'- 9"							
.50	3'- 2"	9'- 6"	15'-10"							
.51	3'- 0"	9'- 0"	15'- 0"							
.52	2'-10"	8'- 6"	14'- 1"							
.53	2'- 8"	7'-11"	13'- 3"	18'- 7"						
.54	2'- 6"	7'- 6"	12'- 6"	17'- 6"						
.55	2'- 4"	7'- 1"	11'-10"	16'- 7"						
.56	2'- 3"	6'- 9"	11'- 3"	15'- 9"						
.57	2'- 2"	6'- 5"	10'- 8"	14'-11"	19'- 3"					
.58	2'- 0"	6'- 1"	10'- 1"	14'- 2"	18'- 3"					
.59	1'-11"	5'- 9"	9'- 7"	13'- 6"	17'- 4"					
.60	1'-10"	5'- 6"	9'- 2"	12'-10"	16'- 6"					
.61	1'- 9"	5'- 3"	8'- 8"	12'- 2"	15'- 8"	19'- 2"				
.62	1'- 8"	5'- 0"	8'- 4"	11'- 7"	14'-11"	18'- 3"				
.63	1'- 7"	4'- 9"	7'-11"	11'- 1"	14'- 3"	17'- 5"				
.64	1'- 6"	4'- 6"	7'- 6"	10'- 6"	13'- 6"	16'- 7"	19'- 7"			
.65	1'- 5"	4'- 4"	7'- 2"	10'- 1"	12'-11"	15'- 9"	18'- 8"			
.66	1'- 4"	4'- 1"	6'-10"	9'- 7"	12'- 4"	15'- 1"	17'-10"			
.67	1'- 4"	3'-11"	6'- 7"	9'- 3"	11'-10"	14'- 6"	17'- 1"			
.68	1'- 3"	3'- 9"	6'- 3"	8'- 9"	11'- 4"	13'-10"	16'- 4"			
.69	1'- 2"	3'- 7"	6'- 0"	8'- 5"	10'-10"	13'- 2"	15'- 7"	18'- 0"		
.70	1'- 2"	3'- 5"	5'- 9"	8'- 1"	10'- 4"	12'- 8"	14'-11"	17'- 3"		
.71	1'- 1"	3'- 4"	5'- 6"	7'- 9"	9'-11"	12'- 2"	14'- 4"	16'- 7"	18'- 9"	
.72	1'- 1"	3'- 2"	5'- 4"	7'- 5"	9'- 6"	11'- 8"	13'- 9"	15'-11"	18'- 0"	
.73	1'- 0"	3'- 1"	5'- 1"	7'- 1"	9'- 2"	11'- 2"	13'- 2"	15'-'3"	17'- 3"	19'- 3"
.74	1'- 0"	2'-11"	4'-11"	6'-10"	8'- 9"	10'- 9"	12'- 8"	14'- 8"	16'- 7"	18'- 6"
.75	0'-11"	2'-10"	4'- 8"	6'- 7"	8'- 5"	10'- 3"	12'- 2"	14'- 0"	15'-11"	17'- 9"
.76	0' 11"	2'- 8"	4'- 6"	6'- 4"	8'- 1"	9'-11"	11'- 8"	13'- 6"	15'- 4"	17'- 1"
.77	0'-10"	2'- 7"	4'- 4"	6'- 1"	7'- 9"	9'- 6"	11'- 3"	13'- 0"	14'- 9"	16'- 5"
.78	0'-10"	2'- 6"	4'- 2"	5'-10"	7'- 6"	9'- 2"	10'- 9"	12'- 5"	14'- 1"	15'- 9"
.79	0'-10"	2'- 5"	4'- 0"	5'- 7"	7'- 2"	8'-10"	10'- 5"	12'- 0"	13'- 7"	15'- 2"
.80	0'- 9"	2'- 4"	3'-10"	5'- 5"	6'-11"	8'- 6"	10'- 0"	11'- 7"	13'- 1"	14'- 8"
	.01	.02	.03	.04	.05	.06	.07	.08	.09	.10

NOTE.—The usual way of measuring the perpendicular depth of tank, driving nail in pole at that point and hanging same on outside, brings bottom of pole too high, if tank has much taper, and then the circumferences measured near the bottom are too small.

ERRORS IN TABLE 3

At 20.44 ft. read 921
" 20.45 " " 927
" 40.76 " " 547
" 49.69 " " 995
" 53.10 " " 963
" 56.51 " " 261
" 85.45 " " 489
" 93.38 " " 589

Table 3 shows capacities of cylinders per foot of depth, in bbls. of 42 U. S. gallons each, and for every 1-100 foot of circumference, from 15 feet to 105 feet.

Formula: Bbls. equal $C^2 \div 70.555$ where C equals circumference in feet. The circumferences in feet and tenths are shown in first column. The figures at heads of columns 2 to 11 (both inclusive) indicate hundredths of feet circumference. Example—To find capacity of cylinder 18.37 feet in circumference we look in column 1 for 18.3 and then follow the horizontal line to column having figure 7 at head, where we find capacity 4.783 bbls. per foot. An asterisk (*) placed before a number indicates that the number should be preceded by the whole number in 2d column next line below. Thus: Capacity of cylinder 18.78 feet in circumference equals 4.999 bbls. per foot, while capacity of cylinder 18.79 feet in circumference equals 5.004 bbls. per foot.

TABLE 3.

C	0	1	2	3	4	5	6	7	8	9
15.0	3.189	193	198	202	206	210	215	219	223	227
1	232	236	240	245	249	253	257	262	266	270
2	275	279	283	288	292	296	301	305	309	314
3	318	322	327	331	335	340	344	348	353	357
4	361	366	370	374	379	383	388	392	396	401
5	405	410	414	418	423	427	432	436	440	445
6	449	454	458	463	467	471	476	480	485	489
7	494	498	502	507	511	516	520	525	529	534
8	538	543	547	552	556	561	565	570	574	579
9	583	588	592	597	601	606	610	615	619	624
16.0	628	633	637	642	647	651	656	660	665	669
1	674	678	683	688	692	697	701	706	710	715
2	720	724	729	733	738	743	747	752	756	761
3	766	770	775	780	784	789	793	798	803	807
4	812	817	821	826	831	835	840	845	849	854
5	859	863	868	873	877	882	887	892	896	901
6	906	910	915	920	924	929	934	939	943	948
7	953	958	962	967	972	977	981	986	991	996
8	4.000	005	010	015	019	024	029	034	038	043
9	048	053	058	062	067	072	077	082	086	091
17.0	096	101	106	111	115	120	125	130	135	140
1	144	149	154	159	164	169	174	178	183	188
2	193	198	203	208	213	217	222	227	232	237
3	242	247	252	257	262	266	271	276	281	286
4	291	296	301	306	311	316	321	326	331	336
5	341	346	350	355	360	365	370	375	380	385
6	390	395	400	405	410	415	420	425	430	435
7	440	445	450	455	460	465	471	476	481	486
8	491	496	501	506	511	516	521	526	531	536
9	541	546	551	557	562	567	572	577	582	587
18.0	592	597	602	607	613	618	623	628	633	638
1	643	648	654	659	664	669	674	679	684	690
2	695	700	705	710	715	721	726	731	736	741
3	746	752	757	762	767	772	778	783	788	793
4	799	804	809	814	819	825	830	835	840	846
5	851	856	861	867	872	877	882	888	893	898
6	903	909	914	919	925	930	935	940	946	951
7	956	962	967	972	978	983	988	993	999	*004
8	5.009	015	020	025	031	036	041	047	052	057
9	063	068	074	079	084	090	095	100	106	111
19.0	117	122	127	133	138	144	149	154	160	165
1	171	176	181	187	192	198	203	209	214	219
2	225	230	236	241	247	252	258	263	269	274
3	279	285	290	296	301	307	312	318	323	329
4	334	340	345	351	356	362	367	373	378	384
5	389	395	400	406	412	417	423	428	434	439
6	445	450	456	462	467	473	478	484	489	495
7	501	506	512	517	523	529	534	540	545	551
8	557	562	568	573	579	585	590	596	602	607
9	613	618	624	630	635	641	647	652	658	664
20.0	669	675	681	686	692	698	703	709	715	720
C	0	1	2	3	4	5	6	7	8	9

C	0	1	2	3	4	5	6	7	8	9
20.0	5.669	675	681	686	692	698	703	709	715	720
1	726	732	738	743	749	755	760	766	772	778
2	783	789	795	801	806	812	818	823	829	835
3	841	846	852	858	864	870	875	881	887	893
4	898	904	910	916	92*f*	92*7*	933	939	945	951
5	956	962	968	974	980	985	991	997	*003	*009
6	6.015	020	026	032	038	044	050	056	061	067
7	073	079	085	091	097	103	108	114	120	126
8	132	138	144	150	156	162	167	173	179	185
9	191	197	203	209	215	221	227	233	239	245
21.0	250	256	262	268	274	280	286	292	298	304
1	310	316	322	328	334	340	346	352	358	364
2	370	376	382	388	394	400	406	412	418	424
3	430	436	442	448	455	461	467	473	479	485
4	491	497	503	509	515	521	527	533	539	546
5	552	558	564	570	576	582	588	594	600	607
6	613	619	625	631	637	643	650	656	662	668
7	674	680	686	693	699	705	711	717	723	730
8	736	742	748	754	760	767	773	779	785	791
9	798	804	810	816	823	829	835	841	847	854
22.0	860	866	872	879	885	891	897	904	910	916
1	922	929	935	941	948	954	960	966	973	979
2	985	991	998	*004	*010	*017	*023	*029	*036	*042
3	7.048	055	061	067	074	080	086	093	099	105
4	112	118	124	131	137	143	150	156	163	169
5	175	182	188	194	201	207	214	220	226	233
6	239	246	252	258	265	271	278	284	291	297
7	303	310	316	323	329	336	342	349	355	361
8	368	374	381	387	394	400	407	413	420	426
9	433	439	446	452	459	465	472	478	485	491
23.0	498	504	511	517	524	530	537	543	550	556
1	563	570	576	583	589	596	602	609	616	622
2	629	635	642	648	655	662	668	675	681	688
3	695	701	708	714	721	728	734	741	748	754
4	761	767	774	781	787	794	801	807	814	821
5	827	834	841	847	854	861	867	874	881	887
6	894	901	907	914	921	927	934	941	948	954
7	961	968	974	981	988	995	*001	*008	*015	*022
8	8.028	035	042	049	055	062	069	076	082	089
9	096	103	110	116	123	130	137	143	150	157
24.0	164	171	177	184	191	198	205	212	218	225
1	232	239	246	253	259	266	273	280	287	294
2	300	307	314	321	328	335	342	349	355	362
3	369	376	383	390	397	404	411	418	424	431
4	438	445	452	459	466	473	480	487	494	501
5	508	515	521	528	535	542	549	556	563	570
6	577	584	591	598	605	612	619	626	633	640
7	647	654	661	668	675	682	689	696	703	710
8	717	724	731	738	745	752	759	766	774	781
9	788	795	802	809	816	823	830	837	844	851
25.0	858	865	873	880	887	894	901	908	915	922
C	0	1	2	3	4	5	6	7	8	9

C	0	1	2	3	4	5	6	7	8	9
25.0	8.858	865	873	880	887	894	901	908	915	922
1	929	936	944	951	958	965	972	979	986	994
2	9.001	008	015	022	029	036	044	051	058	065
3	072	079	087	094	101	108	115	123	130	137
4	144	151	158	166	173	180	187	195	202	209
5	216	223	231	238	245	252	260	267	274	281
6	289	296	303	310	318	325	332	340	347	354
7	361	369	376	383	391	398	405	412	420	427
8	434	442	449	456	464	471	478	486	493	500
9	508	515	522	530	537	544	552	559	566	574
26.0	581	589	596	603	611	618	625	633	640	648
1	655	662	670	677	685	692	699	707	714	722
2	729	737	744	751	759	766	774	781	789	796
3	804	811	818	826	833	841	848	856	863	871
4	878	886	893	901	908	916	923	931	938	946
5	953	961	968	976	983	991	998	*006	*013	*021
6	10.028	036	044	051	059	066	074	081	089	096
7	104	112	119	127	134	142	150	157	165	172
8	180	187	195	203	210	218	226	233	241	248
9	256	264	271	279	287	294	302	309	317	325
27.0	332	340	348	355	363	371	378	386	394	401
1	409	417	424	432	440	448	455	463	471	478
2	486	494	501	509	517	525	532	540	548	556
3	563	571	579	587	594	602	610	618	625	633
4	641	649	656	664	672	680	687	695	703	711
5	719	726	734	742	750	758	765	773	781	789
6	797	805	812	820	828	836	844	852	859	867
7	875	883	891	899	907	914	922	930	938	946
8	954	962	970	977	985	993	*001	*009	*017	*025
9	11.033	041	049	056	064	072	080	088	096	104
28.0	112	120	128	136	144	152	160	168	176	183
1	191	199	207	215	223	231	239	247	255	263
2	271	279	287	295	303	311	319	327	335	343
3	351	359	367	375	383	391	400	408	416	424
4	432	440	448	456	464	472	480	488	496	504
5	512	520	528	537	545	553	561	569	577	585
6	593	601	609	618	626	634	642	650	658	666
7	674	683	691	699	707	715	723	731	740	748
8	756	764	772	780	789	797	805	813	821	830
9	838	846	854	862	871	879	887	895	903	912
29.0	920	928	936	944	953	961	969	977	986	994
1	12.002	010	019	027	035	043	052	060	068	076
2	085	093	101	110	118	126	134	143	151	159
3	168	176	184	193	201	209	218	226	234	242
4	251	259	267	276	284	292	301	309	318	326
5	334	343	351	359	368	376	384	393	401	410
6	418	426	435	443	452	460	468	477	485	494
7	502	510	519	527	536	544	553	561	570	578
8	586	595	603	612	620	629	637	646	654	663
9	671	680	688	697	705	714	722	731	739	748
30.0	756	765	773	782	790	799	807	816	824	833
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30.0	12.756	765	773	782	790	799	807	816	824	833
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2	927	935	944	952	961	970	978	987	995	*004
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4	098	107	116	124	133	142	150	159	167	176
5	185	193	202	211	219	228	237	245	254	263
6	271	280	289	297	306	315	323	332	341	350
7	358	367	376	384	393	402	411	419	428	437
8	445	454	463	472	480	489	498	507	515	524
9	533	542	550	559	568	577	585	594	603	612
31.0	621	629	638	647	656	665	673	682	691	700
1	709	717	726	735	744	753	762	770	779	788
2	797	806	815	823	832	841	850	859	868	877
3	885	894	903	912	921	930	939	948	957	965
4	974	983	992	*001	*010	*019	*028	*037	*046	*055
5	14.064	072	081	090	099	108	117	126	135	144
6	153	162	171	180	189	198	207	216	225	234
7	243	252	261	270	279	288	297	306	315	324
8	333	342	351	360	369	378	387	396	405	414
9	423	432	441	450	459	468	477	486	495	504
32.0	514	523	532	541	550	559	568	577	586	595
1	604	613	623	632	641	650	659	668	677	686
2	695	705	714	723	732	741	750	759	769	778
3	787	796	805	814	824	833	842	851	860	869
4	879	888	897	906	915	925	934	943	952	961
5	971	980	989	998	*007	*017	*026	*035	*044	*054
6	15.063	072	081	091	100	109	118	128	137	146
7	155	165	174	183	193	202	211	220	230	239
8	248	258	267	276	285	295	304	313	323	332
9	341	351	360	369	379	388	397	407	416	425
33.0	435	444	454	463	472	482	491	500	510	519
1	528	538	547	557	566	575	585	594	604	613
2	622	632	641	651	660	670	679	688	698	707
3	717	726	736	745	754	764	773	783	792	802
4	811	821	830	840	849	859	868	878	887	897
5	906	916	925	935	944	954	963	973	982	992
6	16.001	011	020	030	039	049	058	068	077	087
7	097	106	116	125	135	144	154	163	173	183
8	192	202	211	221	231	240	250	259	269	279
9	288	298	307	317	327	336	346	356	365	375
34.0	384	394	404	413	423	433	442	452	462	471
1	481	491	500	510	520	529	539	549	558	568
2	578	587	597	607	617	626	636	646	655	665
3	675	685	694	704	714	723	733	743	753	762
4	772	782	792	801	811	821	831	841	850	860
5	870	880	889	899	909	919	929	938	948	958
6	968	978	987	997	*007	*017	*027	*037	*046	*056
7	17.066	076	086	096	105	115	125	135	145	155
8	164	174	184	194	204	214	224	234	244	253
9	263	273	283	293	303	313	323	333	343	352
35.0	362	372	382	392	402	412	422	432	442	452
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35.0	17.362	372	382	392	402	412	422	432	442	452
1	462	472	482	492	502	512	521	531	541	551
2	561	571	581	591	601	611	621	631	641	651
3	661	671	681	691	701	711	721	731	741	751
4	761	772	782	792	802	812	822	832	842	852
5	862	872	882	892	902	912	922	932	943	953
6	963	973	983	993	*003	*013	*023	*033	*044	*054
7	18.064	074	084	094	104	114	125	135	145	155
8	165	175	185	196	206	216	226	236	246	257
9	267	277	287	297	308	318	328	338	348	358
36.0	369	379	389	399	410	420	430	440	450	461
1	471	481	491	502	512	522	532	543	553	563
2	573	584	594	604	614	625	635	645	656	666
3	676	686	697	707	717	728	738	748	759	769
4	779	789	800	810	820	831	841	851	862	872
5	882	893	903	914	924	934	945	955	965	976
6	986	996	*007	*017	*028	*038	*048	*059	*069	*080
7	19.090	100	111	121	132	142	152	163	173	184
8	194	205	215	225	236	246	257	267	278	288
9	299	309	320	330	340	351	361	372	382	393
37.0	403	414	424	435	445	456	466	477	487	498
1	508	519	529	540	550	561	572	582	593	603
2	614	624	635	645	656	666	677	688	698	709
3	719	730	740	751	762	772	783	793	804	815
4	825	836	846	857	868	878	889	899	910	921
5	931	942	953	963	974	984	995	*006	*016	*027
6	20.038	048	059	070	080	091	102	112	123	134
7	144	155	166	177	187	198	209	219	230	241
8	251	262	273	284	294	305	316	327	337	348
9	359	369	380	391	402	413	423	434	445	456
38.0	466	477	488	499	509	520	531	542	553	563
1	574	585	596	607	617	628	639	650	661	671
2	682	693	704	715	726	737	747	758	769	780
3	791	802	812	823	834	845	856	867	878	889
4	899	910	921	932	943	954	965	976	987	998
5	21.008	019	030	041	052	063	074	085	096	107
6	118	129	140	151	162	172	183	194	205	216
7	227	238	249	260	271	282	293	304	315	326
8	337	348	359	370	381	392	403	414	425	436
9	447	458	469	480	491	502	513	525	536	547
39.0	558	569	580	591	602	613	624	635	646	657
1	668	679	691	702	713	724	735	746	757	768
2	779	790	802	813	824	835	846	857	868	879
3	891	902	913	924	935	946	958	969	980	991
4	22.002	013	025	036	047	058	069	080	092	103
5	114	125	136	148	159	170	181	192	204	215
6	226	237	249	260	271	282	294	305	316	327
7	338	350	361	372	384	395	406	417	429	440
8	451	462	474	485	496	508	519	530	542	553
9	564	575	587	598	609	621	632	643	655	666
40.0	677	689	700	711	723	734	745	757	768	780
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40.0	22.677	689	700	711	723	734	745	757	768	780
1	791	802	814	825	836	848	859	871	882	893
2	905	916	928	939	950	962	973	985	996	*007
3	23.019	030	042	053	065	076	087	099	110	122
4	133	145	156	168	179	190	202	213	225	236
5	248	259	271	282	294	305	317	328	340	351
6	363	374	386	397	409	420	432	443	455	466
7	478	490	501	513	524	536	547	559	570	582
8	593	605	617	628	640	651	663	675	686	698
9	709	721	733	744	756	767	779	791	802	814
41.0	825	837	849	860	872	884	895	907	918	930
1	942	953	965	977	988	*000	*012	*023	*035	*047
2	24.058	070	082	093	105	117	129	140	152	164
3	175	187	199	211	222	234	246	257	269	281
4	293	304	316	328	340	351	363	375	387	398
5	410	422	434	445	457	469	481	492	504	516
6	528	540	551	563	575	587	599	610	622	634
7	646	658	670	681 .	693	705	717	729	741	752
8	764	776	788	800	812	824	835	847	859	871
9	883	895	907	919	930	942	954	966	978	990
42.0	25.002	014	026	038	049	061	073	085	097	109
1	121	133	145	157	169	181	193	205	217	229
2	240	252	264	276	288	300	312	324	336	348
3	360	372	384	396	408	420	432	444	456	468
4	480	492	504	516	528	540	552	565	577	589
5	601	613	625	637	649	661	673	685	697	709
6	721	733	745	758	770	782	794	806	818	830
7	842	854	866	878	891	903	915	927	939	951
8	963	975	988	*000	*012	*024	*036	*048	*060	*073
9	26.085	097	109	121	133	146	158	170	182	194
43.0	207	219	231	243	255	268	280	292	304	316
1	329	341	353	365	377	390	402	414 ·	426	439
2	451	463	475	488	500	512	524	537	549	561
3	573	586	598	610	623	635	647	659	672	684
4	696	709	721	733	746	758	770	783	795	807
5	820	832	844	857	869	881	894	906	918	931
6	943	955	968	980	992	*005	*017	*030	*042	*054
7	27.067	079	092	104	116	129	141	154	166	178
8	191	203	216	228	240	253	265	278	290	303
9	315	327	340	352	365	377	390	402	415	427
44.0	440	452	465	477	490	502	515	527	539	552
1	564	577	590	602	615	627	640	652	665	677
2	690	702	715	727	740	752	765	777	790	803
3	815	828	840	853	865	878	890	903	916	928
4	941	953	966	979	991	*004	*016	*029	*042	*054
5	28.067	079	092	105	117	130	143	155	168	180
6	193	206	218	231	244	256	269	282	294	307
7	320	332	345	358	370	383	396	408	421	434
8	446	459	472	485	497	510	523	535	548	561
9	574	586	599	612	625	637	650	663	676	688
45.0	701	714	727	739	752	765	778	790	803	816
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45.0	28.701	714	727	739	752	765	778	790	803	816
1	829	842	854	867	880	893	906	918	931	944
2	957	970	982	995	*008	*021	*034	*047	*059	*072
3	29.085	098	111	124	136	149	162	175	188	201
4	214	226	239	252	265	278	291	304	317	329
5	342	355	368	381	394	407	420	433	446	459
6	471	484	497	510	523	536	549	562	575	588
7	601	614	627	640	653	666	679	692	705	718
8	731	744	757	770	783	796	809	822	835	848
9	861	874	887	900	913	926	939	952	965	978
46.0	991	*004	*017	*030	*043	*056	*069	*082	*095	*108
1	30.121	134	147	161	174	187	200	213	226	239
2	252	265	278	291	305	318	331	344	357	370
3	383	396	410	423	436	449	462	475	488	502
4	515	528	541	554	567	580	594	607	620	633
5	646	660	673	686	699	712	725	739	752	765
6	778	791	805	818	831	844	858	871	884	897
7	911	924	937	950	964	977	990	*003	*017	*030
8	31.043	056	070	083	096	109	123	136	149	163
9	176	189	202	216	229	242	256	269	282	295
47.0	309	322	336	349	362	376	389	402	416	429
1	442	456	469	482	496	509	522	536	549	563
2	576	589	603	616	630	643	656	670	683	697
3	710	723	737	750	764	777	790	804	817	831
4	844	858	871	884	898	911	925	938	952	965
5	979	992	*006	*019	*033	*046	*059	*073	*086	*100
6	32.113	127	140	154	167	181	194	208	221	235
7	248	262	276	289	303	316	330	343	357	370
8	384	397	411	425	438	452	465	479	492	506
9	519	533	547	560	574	587	601	615	628	642
48.0	655	669	683	696	710	723	737	751	764	778
1	792	805	819	833	846	860	873	887	901	914
2	928	942	955	969	983	996	*010	*024	*037	*051
3	33.065	079	092	106	120	133	147	161	175	188
4	202	216	229	243	257	271	284	298	312	326
5	339	353	367	381	394	408	422	436	449	463
6	477	491	504	518	532	546	560	573	587	601
7	615	629	642	656	670	684	698	712	725	739
8	753	767	781	795	808	822	836	850	864	878
9	891	905	919	933	947	961	975	989	*002	*016
49.0	34.030	044	058	072	086	100	114	128	141	155
1	169	183	197	211	225	239	253	267	281	295
2	309	323	337	350	364	378	392	406	420	434
3	448	462	476	490	504	518	532	546	560	574
4	588	602	616	630	644	658	672	686	700	714
5	728	742	756	770	784	798	813	827	841	855
6	869	883	897	911	925	939	953	967	981	995
7	35.009	024	038	052	066	080	094	108	122	136
8	150	165	179	193	207	221	235	249	263	278
9	292	306	320	334	348	363	377	391	405	419
50.0	433	448	462	476	490	504	518	533	547	561
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50.0	35.433	448	462	476	490	504	518	533	547	561
1	575	589	604	618	632	646	661	675	689	703
2	717	732	746	760	774	789	803	817	831	846
3	860	874	888	903	917	931	945	960	974	988
4	36.003	017	031	045	060	074	088	103	117	131
5	146	160	174	189	203	217	232	246	260	275
6	289	303	318	332	346	361	375	389	404	418
7	432	447	461	476	490	504	519	533	548	562
8	576	591	605	620	634	648	663	677	692	706
9	720	735	749	764	778	793	807	822	836	850
51.0	865	879	894	908	923	937	952	966	981	995
1	37.010	024	039	053	068	082	097	111	126	140
2	155	169	184	198	213	227	242	256	271	285
3	300	314	329	344	358	373	387	402	416	431
4	445	460	475	489	504	518	533	548	562	577
5	591	606	620	635	650	664	679	694	708	723
6	737	752	767	781	796	811	825	840	855	869
7	884	898	913	928	942	957	972	986	*001	*016
8	38.031	045	060	075	089	104	119	133	148	163
9	177	192	207	222	236	251	266	281	295	310
52.0	325	339	354	369	384	399	413	428	443	458
1	472	487	502	517	531	546	561	576	591	605
2	620	635	650	665	679	694	709	724	739	753
3	768	783	798	813	828	842	857	872	887	902
4	917	931	946	961	976	991	*006	*021	*036	*050
5	39.065	080	095	110	125	140	155	170	184	199
6	214	229	244	259	274	289	304	319	334	349
7	364	378	393	408	423	438	453	468	483	498
8	513	528	543	558	573	588	603	618	633	648
9	663	678	693	708	723	738	753	768	783	798
53.0	813	828	843	858	873	888	903	918	933	948
1	963	978	993	*009	*024	*039	*054	*069	*084	*099
2	40.114	129	144	159	174	189	205	220	235	250
3	265	280	295	310	325	341	356	371	386	401
4	416	431	446	462	477	492	507	522	537	553
5	568	583	598	613	628	644	659	674	689	704
6	719	735	750	765	780	796	811	826	841	856
7	872	887	902	917	932	948	963	978	993	*009
8	41.024	039	054	070	085	100	116	131	146	161
9	177	192	207	222	238	253	268	284	299	314
54.0	330	345	360	375	391	406	421	437	452	467
1	483	498	513	529	544	559	575	590	606	621
2	636	652	667	682	698	713	728	744	759	775
3	790	805	821	836	852	867	882	898	913	929
4	944	959	975	990	*006	*021	*037	*052	*068	*083
5	42.098	114	129	145	160	176	191	207	222	238
6	253	269	284	299	315	330	346	361	377	392
7	408	423	439	454	470	486	501	517	532	548
8	563	579	594	610	625	641	656	672	688	703
9	719	734	750	765	781	796	812	828	843	859
55.0	874	890	906	921	937	952	968	984	999	*015
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55.0	42.874	890	906	921	937	952	968	984	999	*015
1	43.030	046	062	077	093	109	124	140	156	171
2	187	202	218	234	249	265	281	296	312	328
3	343	359	375	390	406	422	438	453	469	485
4	500	516	532	547	563	579	595	610	626	642
5	657	673	689	705	720	736	752	768	783	799
6	815	831	846	862	878	894	910	925	941	957
7	973	988	*004	*020	*036	*052	*067	*083	*099	*115
8	44.131	147	162	178	194	210	226	242	257	273
9	289	305	321	337	352	368	384	400	416	432
56.0	448	464	479	495	511	527	543	559	575	591
1	607	622	638	654	670	686	702	718	734	750
2	766	782	798	814	829	845	861	877	893	909
3	925	941	957	973	989	*005	*021	*037	*053	*069
4	45.085	101	117	133	149	165	181	197	213	229
5	245	461	277	293	309	325	341	357	373	389
6	405	421	437	453	469	485	502	518	534	550
7	566	582	598	614	630	646	662	678	694	711
8	727	743	759	775	791	807	823	839	856	872
9	888	904	920	936	952	969	985	*001	*017	*033
57.0	46.049	065	082	098	114	130	146	162	179	195
1	211	227	243	260	276	292	308	324	341	357
2	373	389	405	422	438	454	470	487	503	519
3	535	551	568	584	600	616	633	649	665	682
4	698	714	730	747	763	779	795	812	828	844
5	861	877	893	910	926	942	959	975	991	*007
6	47.024	040	056	073	089	105	122	138	154	171
7	187	204	220	236	253	269	285	302	318	335
8	351	367	384	400	416	433	449	466	482	498
9	515	531	548	564	581	597	613	630	646	663
58.0	679	696	712	729	745	761	778	794	811	827
1	844	860	877	893	910	926	943	959	976	992
2	48.009	025	042	058	075	091	108	124	141	157
3	174	190	207	223	240	256	273	289	306	323
4	339	356	372	389	405	422	438	455	472	488
5	505	521	538	555	571	588	604	621	638	654
6	671	687	704	721	737	754	770	787	804	820
7	837	854	870	887	904	920	937	954	970	987
8	49.004	020	037	054	070	087	104	120	137	154
9	170	187	204	220	237	254	271	287	304	321
59.0	337	354	371	388	404	421	438	455	471	488
1	505	522	538	555	572	589	605	622	639	656
2	673	689	706	723	740	756	773	790	807	824
3	840	857	874	891	908	925	941	958	975	992
4	50.009	026	042	059	076	093	110	127	144	160
5	177	194	211	228	245	262	278	295	312	329
6	346	363	380	397	414	431	447	464	481	498
7	515	532	549	566	583	600	617	634	651	668
8	684	701	718	735	752	769	786	803	820	837
9	854	871	888	905	922	939	956	973	990	*007
60.0	51.024	041	058	075	092	109	126	143	160	177
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3	536	·553	570	587	604	621	638	655	672	690
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6	52.050	067	084	101	118	136	153	170	187	204
7	222	239	256	273	290	308	325	342	359	377
8	.394	411	428	446	463	480	497	515	532	549
9	566	584	601	618	635	653	670	687	704	722
61.0	739	756	774	791	808	826	843	860	877	895
1	912	929	947	964	981	999	*016	*033	*051	*068
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3	259	276	294	311	329	346	363	381	398	416
4	433	450	468	485	503	520	537	555	572	590
5	607	625	642	659	677	694	712	729	747	764
6	782	799	817	834	852	869	886	904	921	939
7	956	974	991	*009	*026	*044	*061	*079	*096	*114
8	54.131	149	166	184	202	219	237	254	272	289
9	307	324	342	359	377	395	412	430	447	465
62.0	482	500	518	535	553	570	588	605	623	641
1	658	676	693	711	729	746	764	782	799	817
2	834	852	870	887	905	923	940	958	976	993
3	55.011	029	046	064	082	099	117	135	152	170
4	188	205	223	241	258	276	294	312	329	347
5	365	382	400	418	435	453	471	489	506	524
6	542	560	577	595	613	631	649	666	684	702
7	720	737	755	773	791	808	826	844	862	880
8	897	915	933	951	969	986	*004	*022	*040	*058
9	56.076	093	111	129	147	165	183	200	218	236
63.0	254	272	290	308	326	343	361	379	397	415
1	433	451	469	486	504	522	540	558	576	594
2	612	630	648	666	683	701	719	737	755	773
3	791	809	827	845	863	881	899	917	935	953
4	971	989	*007	*025	*043	*061	*079	*097	*115	*132
5	57.150	168	187	205	223	241	259	277	295	313
6	331	349	367	385	403	421	439	457	475	493
7	511	529	547	565	583	601	619	638	656	674
8	692	710	728	746	764	782	800	818	837	855
9	873	891	909	927	945	963	982	*000	*018	*036
64.0	58.054	072	090	109	127	145	163	181	199	217
1	236	254	272	290	308	326	345	363	381	399
2	417	436	454	472	490	508	527	545	563	581
3	600	618	636	654	673	691	709	727	746	764
4	782	800	819	837	855	873	892	910	928	946
5	965	983	*001	*020	*038	*056	*074	*093	*111	*129
6	59.148	166	184	203	221	239	258	276	294	313
7	331	349	368	386	404	423	441	459	478	496
8	514	533	551	570	588	606	625	643	662	680
9	698	717	735	754	772	790	809	827	846	864
65.0	882	901	919	938	956	975	993	*011	*030	*048
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1	60.067	085	104	122	141	159	178	196	215	233
2	251	270	288	307	325	344	362	381	399	418
3	436	455	473	492	511	529	548	566	585	603
4	622	640	659	677	696	714	733	752	770	789
5	807	826	844	863	882	900	919	937	956	974
6	993	*012	*030	*049	*067	*086	*105	*123	*142	*161
7	61.179	198	216	235	254	272	291	310	328	347
8	366	384	403	421	440	459	477	496	515	533
9	552	571	590	608	627	646	664	683	702	720
66.0	739	758	777	795	814	833	851	870	889	908
1	926	945	964	983	*001	*020	*039	*058	*076	*095
2	62.114	133	151	170	189	208	227	245	264	283
3	302	320	339	358	377	396	414	433	452	471
4	490	509	527	546	565	584	603	622	640	659
5	678	697	716	735	754	772	791	810	829	848
6	867	886	905	923	942	961	980	999	*018	*037
7	63.056	075	094	112	131	150	169	188	207	226
8	245	264	283	302	321	340	359	378	396	415
9	434	453	472	491	510	529	548	567	586	605
67.0	624	643	662	681	700	719	738	757	776	795
1	814	833	852	871	890	909	928	947	967	986
2	64.005	024	043	062	081	100	119	138	157	176
3	195	214	233	253	272	291	310	329	348	367
4	386	405	424	443	463	482	501	520	539	558
5	577	596	616	635	654	673	692	711	731	750
6	769	788	807	826	846	865	884	903	922	941
7	961	980	999	*018	*037	*057	*076	*095	*114	*133
8	65.153	172	191	210	230	249	268	287	306	326
9	345	364	383	403	422	441	461	480	499	518
68.0	538	557	576	595	615	634	653	673	692	711
1	730	750	769	788	808	827	846	866	885	904
2	924	943	962	982	*001	*020	*040	*059	*078	*098
3	66.117	136	156	175	195	214	233	253	272	292
4	311	330	350	369	388	408	427	447	466	485
5	505	524	544	563	583	602	621	641	660	680
6	699	719	738	758	777	797	816	835	855	874
7	894	913	933	952	972	991	*011	*030	*050	*069
8	67.089	108	128	147	167	186	206	225	245	264
9	284	303	323	342	362	382	401	421	440	460
69.0	479	499	518	538	558	577	597	616	636	655
1	675	695	714	734	753	773	793	812	832	851
2	971	891	910	930	950	969	989	*009	*028	*048
3	68.067	087	107	126	146	166	185	205	225	244
4	264	284	303	323	343	362	382	402	422	441
5	461	481	500	520	540	559	579	599	619	638
6	658	678	698	717	737	757	776	796	816	836
7	855	875	895	915	935	954	974	994	*014	*033
8	69.053	073	093	113	132	152	172	192	212	231
9	251	271	291	311	330	350	370	390	410	430
70.0	449	469	489	509	529	549	569	588	608	628
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1	648	668	688	708	728	747	767	787	807	827
2	847	867	887	907	926	946	966	986	*006	*026
3	70.046	066	086	106	126	146	166	186	206	225
4	245	265	285	305	325	345	365	385	405	425
5	445	465	485	505	525	545	565	585	605	625
6	645	665	685	705	725	745	765	785	805	825
7	845	865	885	906	926	946	966	986	*006	*026
8	71.046	066	086	106	126	146	166	186	207	227
9	247	267	287	307	327	347	367	388 .	408	428
71.0	448	468	488	508	528	549	569	589	609	629
1	649	669	690	710	730	750	770	790	811	831
2	851	871	891	912	932	952	972	992	*013	*033
3	72.053	073	093	114	134	154	174	194	215	235
4	255	275	296	316	336	356	377	397	417	437
5	458	478	498	519	539	559	579	600	620	640
6	661	681	701	721	742	762	782	803	823	843
7	864	884	904	925	945	965	986	*006	*026	*047
8	73.067	087	108	128	148	169	189	210	230	250
9	271	291	311	332	352	373	393	413	434	454
72.0	475	495	515	536	556	577	597	618	638	658
1	679	699	720	740	761	781	802	822	843	863
2	883	904	924	945	965	986	*006	*027	*047	*068
3	74.088	109	129	150	170	191	211	232	252	273
4	293	314	334	355	375	396	417	437	458	478
5	499	519	540	560	581	601	622	643	663	684
6	704	725	746	766	787	807	828	848	869	890
7	910	931	952	972	993	*013	*034	*055	*075	*096
8	75.117	137	158	178	199	220	240	261	282	302
9	323	344	364	385	406	426	447	468	488	509
73.0	530	551	571	592	613	633	654	675	695	716
1	737	758	778	799	820	841	861	882	903	923
2	944	965	986	*006	*027	*048	*069	*090	*110	*131
3	76.152	173	193	214	235	256	277	297	318	339
4	360	381	401	422	443	464	485	505	526	547
5	568	589	610	630	651	672	693	714	735	756
6	776	797	818	839	860	881	902	923	943	964
7	985	*006	*027	*048	*069	*090	*111	*132	*152	*173
8	77.194	215	236	257	278	299	320	341	362	383
9	404	425	446	466	487	508	529	550	571	592
74.0	613	634	655	676	697	718	739	760	781	802
1	823	844	865	886	907	928	949	970	991	*012
2	78.033	054	075	096	118	139	160	181	202	223
3	244	265	286	307	328	349	370	391	412	434
4	455	476	497	518	539	560	581	602	623	644
5	666	687	708	729	750	771	792	814	835	856
6	877	898	919	940	962	983	*004	*025	*046	*067
7	79.089	110	131	152	173	195	216	237	258	279
8	300	322	343	364	385	407	428	449	470	491
9	513	534	555	576	598	619	640	661	683	704
75.0	725	746	768	789	810	831	853	874	895	917
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1	938	959	980	*002	*023	*044	*066	*087	*108	*130
2	80.151	172	194	215	236	258	279	300	322	343
3	364	386	407	428	450	471	492	514	535	556
4	578	599	621	642	663	685	706	728	749	770
5	792	813	835	856	877	899	920	942	963	984
6	81.006	027	049	070	092	113·	135	156	177	199
7	220	242	263	285	306	328	349	371	392	414
8	435	457	478	500	521	543	564	586	607	629
9	650	672	693	715	736	758	779	801	822	844
76.0	865	887	908	930	951	973	995	*016	*038	*059
1	·82.081	102	124	146	167	189	210	232	254	275
2	297	318	340	362	383	405	426	448	470	491
3	513	534	556	578	599	621	643	664	686	708
4	729	751	773	794	816	838	859	881	903	924
5	946	968	989	*011	*033	*054	*076	*098	*120	*141
6	83.163	185	206	228	250	272	293	315	337	358
7	380	402	424	445	467	489	511	532	554	576
8	598	620	641	663	685	707	728	750·	772	794
9	816	837	859	881	903	925	947	968	990	*012
77.0	84.034	056	077	099	121	143	165	187	209	230
1	252	274	296	318	340	362	383	405	427	449
2	471	493	515	537	558	580	602	624	646	668
3	690	712	734	756	778	799	821	843	865	887
4	909	931	953	975	997	*019	*041	*063	*085	*107
5	85.129	151	173	195	217	239	261	283	305	327
6	349	371	393	415	437	459	481	503	525	547
7	569	591	613	635	657	679	701 ,	723	745	767
8	789	811	833	855	877	899	921	943	966	988
9	86.010	032	054	076	098	120	142	164	186	209
78.0	231	253	275	297	319	341	363	386	408	430
1	452	474	496	518	540	563	585	607	629	651
2	673	696	718	740	762	784	807	829	851	873
3	895	917	940	962	984	*006	*028	*051	*073	*095
4	87.117	140	162	184	206	229	251	273	295	317
5	340	362	384	406	429	451	473	496	518	540
6	562	585	607	629	652	674	696	718	741	763
7	785	808	830	852	875	897	919	942	964	986
8	88.009	031	053	076	098	120	143	165	187	210
9	232	254	277	299	322	344	366	389	411	434
79.0	456	478	501	523	546	568	590	613	635	658
1	680	702	725	747	770	792	815	837	859	882
2	904	927	949	972	994	*017	*039	*062	*084	*107
3	89.129	151	174	196	219	241	264	286	309	331
4	354	376	399	421	444	467	489	512	534	557
5	579	602	624	647	669	692	714	737	760	782
6	805	827	850	872	895	917	940	963	985	*008
7	90.030	053	076	098	121	143	166	189	211	234
8	256	279	302	324	347	370	392	415	438	460
9	483	505	528	551	573	596	619	641	664	687
80.0	709	732	755	778	800	823	846	868	891	914
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80.0	90.709	732	755	778	800	823	846	868	891	914
1	936	959	982	*005	*027	*050	*073	*095	*118	*141
2	91.164	186	209	232	255	277	300	323	346	368
3	391	414	437	459	482	505	528	550	573	596
4	619	642	664	687	710	733	756	778	801	824
5	847	870	893	915	938	961	984	*007	*030	*052
6	92.075	098	121	144	167	189	212	235	258	281
7	304	327	350	372	395	418	441	464	487	510
8	533	556	579	601	624	647	670	693	716	739
9	762	785	808	831	854	877	900	923	945	968
81.0	991	*014	*037	*060	*083	*106	*129	*152	*175	*198
1	93.221	244	267	290	313	336	359	382	405	428
2	451	474	497	520	543	566	589	612	635	658
3	681	705	728	751	774	797	820	843	866	889
4	912	935	958	981	*004	*027	*051	*074	*097	*120
5	94.143	166	189	212	235	259	282	305	328	351
6	374	397	420	444	467	490	513	536	559	582
7	606	629	652	675	698	721	745	768	791	814
8	837	861	884	907	930	953	977	*000	*023	*046
9	95.069	093	116	139	162	185	209	232	255	278
82.0	302	325	348	371	395	418	441	464	488	511
1	534	557	581	604	627	651	674	697	720	744
2	767	790	814	837	860	884	907	930	954	977
3	96.000	024	047	070	094	117	140	164	187	210
4	234	257	280	304	327	351	374	397	421	444
5	467	491	514	538	561	584	608	631	655	678
6	701	725	748	772	795	819	842	865	889	912
7	936	959	983	*006	*029	*053	*076	*100	*123	*147
8	97.170	194	217	241	264	288	311	335	358	382
9	405	429	452	476	499	523	546	570	593	617
83.0	640	664	687	711	734	758	781	805	829	852
1	876	899	923	946	970	993	*017	*041	*064	*088
2	98.111	135	159	182	206	229	253	277	300	324
3	347	371	395	418	442	465	489	513	536	560
4	584	607	631	655	678	702	725	749	773	796
5	820	844	867	891	915	939	962	986	*010	*033
6	99.057	081	104	128	152	176	199	223	247	270
7	294	318	342	365	389	413	437	460	484	508
8	531	555	579	603	627	650	674	698	722	745
9	769	793	817	841	864	888	912	936	960	983
.84.0	100.007	031	055	079	102	126	150	174	198	222
1	245	269	293	317	341	365	389	412	436	460
2	484	508	532	556	579	603	627	651	675	699
3	723	747	771	794	818	842	866	890	914	938
4	962	986	*010	*034	*058	*082	*105	*129	*153	*177
5	101.201	225	249	273	297	321	345	369	393	417
6	441	465	489	513	537	561	585	609	633	657
7	681	705	729	753	777	801	825	849	873	897
8	921	945	969	993	*017	*041	*065	*089	*114	*138
9	102.162	186	210	234	258	282	306	330	354	378
85.0	402	427	451	475	499	523	547	571	595	619
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1	644	668	692	716	740	764	788	812	837	861
2	885	909	933	957	982	*006	*030	*054	*078	*102
3	103.127	151	175	199	223	247	272	296	320	344
4	368	393	417	441	465	48?	514	538	562	586
5	611	635	659	683	708	732	756	780	805	829
6	853	877	902	926	950	975	999	*023	*047	*072
7	104.096	120	145	169	193	218	242	266	290	315
8	339	363	388	412	436	461	485	509	534	558
9	582	607	631	656	680	704	729	753	777	802
86.0	826	850	875	899	924	948	972	997	*021	*046
1	105.070	094	119	143	168	192	217	241	265	290
2	314	339	363	388	412	436	461	485	510	534
3	559	583	608	632	657	681	706	730	755	779
4	803	828	852	877	901	926	950	975	*000	*024
5	106.049	073	098	122	147	171	196	220	245	269
6	294	318	343	368	392	417	441	466	490	515
7	540	564	589	613	638	662	687	712.	736	761
8	785	810	835	859	884	909	933	958	982	*007
9	107.032	056	081	106	130	155	180	204	229	253
87.0	278	303	327	352	377	401	426	451	476	500
1	525	550	574	599	624	648	673	698	722	747
2	772	797	821	846	871	896	920	945	970	994
3	108.019	044	069	094	118	143	168	193	217	242
4	267	292	316	341	366	391	416	440	465	490
5	515	540	564	589	614	639	664	688	713	738
6	763	788	813	837	862	887	912	937	962	987
7	109.011	036	061	086	111	136	161	185	210	235
8	260	285	310	335	360	385	410	434	459	484
9	509	534	559	584	609	634	659	684	709	734
88.0	758	783	808	833	858	883	908	933	958	983
1	110.008	033	058	083	108	133	158	183	208	233
2	258	283	308	333	358	383	408	433	458	483
3	508	533	558	583	608	633	658	683	708	733
4	759	784	809	834	859	884	909	934	959	984
5	111.009	034	059	085	110	135	160	185	210	235
6	260	285	311	336	361	386	411	436	461	486
7	512	537	562	587	612	637	662	688	713	738
8	763	788	813	839	864	889	914	939	965	990
9	112.015	040	065	091	116	141	166	191	217	242
89.0	267	292	318	343	368	393	419	444	469	494
1	520	545	570	595	621	646	671	696	722	747
2	772	798	823	848	873	899	924	949	975	*000
3	113.025	051	076	101	127	152	177	202	228	253
4	278	304	329	355	380	405	431	456	481	507
5	532	557	583	608	634	659	684	710	735	760
6	786	811	837	862	888	913	938	964	989	*015
7	114.040	065	091	116	142	167	193	218	244	269
8	294	320	345	371	396	422	447	473	498	524
9	549	575	600	626	651	677	702	728	753	779
90.0	804	830	855	881	906	932	957	983	*008	*034
C	0	1	2	3	4	5	6	7	8	9

C	0	1	2	3	4	5	6	7	8	9
90.0	114.804	830	855	881	906	932	957	983	*008	*034
1	115.059	085	111	136	162	187	213	238	264	289
2	315	341	366	392	417	443	468	494	520	545
3	571	596	622	648	673	699	724	750	776	801
4	827	853	878	904	929	955	981	*006	*032	*058
5	116.083	109	135	160	186	212	237	263	289	314
6	340	366	391	417	443	468	494	520	546	571
7	597	623	648	674	700	726	751	777	803	828
8	854	880	906	931	957	983	*009	*034	*060	*086
9	117.112	137	163	189	215	241	266	292	318	344
91.0	370	395	421	447	473	499	524	550	576	602
1	628	653	679	705	731	757	783	808	834	860
2	886	912	938	964	989	*015	*041	*067	*093	*119
3	118.145	171	196	222	248	274	300	326	352	378
4	404	430	455	481	507	533	559	585	611	637
5	663	689	715	741	767	793	819	844	870	896
6	922	948	974	*000	*026	*052	*078	*104	*130	*156
7	119.182	208	234	260	286	312	338	364	390	416
8	442	468	494	520	546	572	598	624	650	677
9	703	729	755	781	807	833	859	885	911	937
92.0	963	989	*015	*041	*068	*094	*120	*146	*172	*198
1	120.224	250	276	303	329	355	381	407	433	459
2	485	512	538	564	590	616	642	668	695	721
3	747	773	799	825	852	878	904	930	956	982
4	121.009	035	061	087	113	140	166	192	218	245
5	271	297	323	349	376	402	428	454	481	507
6	533	559	586	612	638	664	691	717	743	769
7	796	822	848	875	901	927	953	980	*006	*032
8	122.059	085	111	138	164	190	217	243	269	295
9	322	348	374	401	427	454	480	506	533	559
93.0	585	612	638	664	691	717	744	770	796	823
1	849	875	902	928	955	981	*007	*034	*060	*087
2	123.113	140	166	192	219	245	272	298	325	351
3	377	404	430	457	483	510	536	563	589	616
4	642	669	695	722	748	775	801	828	854	880
5	907	933	960	987	*013	*040	*066	*093	*119	*146
6	124.172	199	225	252	278	305	331	358	385	411
7	438	464	491	517	544	570	597	624	650	677
8	703	730	757	783	810	836	863	890	916	943
9	969	996	*023	*049	*076	*103	*129	*156	*182	*209
94.0	125.236	262	289	316	342	369	396	422	449	476
1	502	529	556	582	609	636	662	689	716	743
2	769	796	823	849	876	903	930	956	983	*010
3	126.036	063	090	117	143	170	197	224	250	277
4	304	331	357	384	411	438	464	491	518	545
5	572	598	625	652	679	706	732	759	786	813
6	840	866	893	920	947	974	*001	*027	*054	*081
7	127.108	135	162	188	215	242	269	296	323	350
8	376	403	430	457	484	511	538	565	592	618
9	645	672	699	726	753	780	807	834	861	888
95.0	914	941	968	995	*022	*049	*076	*103	*130	*157
C	0	1	2	3	4	5	6	7	8	9

C	0	1	2	3	4	5	6	7	8	9
95.0	127.914	941	968	995	*022	*049	*076	*103	*130	*157
1	128.184	211	238	265	292	319	346	373	400	427
2	454	481	508	535	562	589	616	643	670	697
3	724	751	778	805	832	859	886	913	940	967
4	994	*021	*048	*075	*102	*129	*156	*183	*210	*237
5	129.264	292	319	346	373	400	427	454	481	508
6	535	562	590	617	644	671	698	725	752	779
7	806	834	861	888	915	942	969	996	*024	*051
8	130*078	105	132	159	187	214	241	268	295	322
9	350	377	404	431	458	486	513	540	567	594
96.0	622	649	676	703	730	758	785	812	839	867
1	894	921	948	976	*003	*030	*057	*085	*112	*139
2	131.166	194	221	248	276	303	330	357	385	412
3	439	467	494	521	548	576	603	630	658	685
4	712	740	767	794	822	849	876	904	931	958
5	986	*013	*041	*068	*095	*123	*150	*177	*205	*232
6	132.259	287	314	342	369	396	424	451	479	506
7	533	561	588	616	643	671	698	725	753	780
8	808	835	863	890	917	945	972	*000	*027	*055
9	133.082	110	137	165	192	220	247	275	302	330
97.0	357	385	412	440	467	495	522	550	577	605
1	632	660	687	715	742	770	797	825	852	880
2	908	935	963	990	*018	*045	*073	*101	*128	*156
3	134.183	211	238	266	294	321	349	376	404	432
4	459	487	514	542	570	597	625	653	680	708
5	735	763	791	818	846	874	901	929	957	984
6	135.012	040	067	095	123	150	178	206	233	261
7	289	316	344	372	400	427	455	483	510	538
8	566	594	621	649	677	705	732	760	788	816
9	843	871	899	927	954	982	*010	*038	*065	*093
98.0	136.121	149	176	204	232	260	288	315	343	371
1	399	427	455	482	510	538	566	594	621	649
2	677	705	733	761	789	816	844	872	900	928
3	956	984	*011	*039	*067	*095	*123	*151	*179	*207
4	137.234	262	290	318	346	374	402	430	458	486
5	514	542	569	597	625	653	681	709	737	765
6	793	821	849	877	905	933	961	989	*017	*045
7	138.073	101	129	157	185	213	241	269	297	325
8	353	381	409	437	465	493	521	549	577	605
9	633	661	689	717	745	773	801	829	857	885
99.0	913	941	970	998	*026	*054	*082	*110	*138	*166
1	139.194	222	250	278	307	335	363	391	419	447
2	475	503	531	560	588	616	644	672	700	728
3	756	785	813	841	869	897	925	954	982	*010
4	140.038	066	094	123	151	179	207	235	264	292
5	320	348	376	405	433	461	489	517	546	574
6	602	630	659	687	715	743	771	800	828	856
7	884	913	941	969	998	*026	*054	*082	*111	*139
8	141.167	196	224	252	280	309	337	365	394	422
9	450	479	507	535	564	592	620	649	677	705
100.0	734	762	790	819	847	875	904	932	960	989
C	0	1	2	3	4	5	6	7	8	9

C	0	1	2	3	4	5	6	7	8	9
100.0	141.734	762	790	819	847	875	904	932	960	989
1	142.017	046	074	102	131	159	187	216	244	273
2	301	329	358	386	415	443	472	500	528	557
3	585	614	642	671	699	727	756	784	813	841
4	870	898	927	955	984	*012	*041	*069	*097	*126
5	143.154	183	211	240	268	297	325	354	382	411
6	439	468	497	525	554	582	611	639	668	696
7	725	753	782	810	839	868	896	925	953	982
8	144.010	039	068	096	125	153	182	210	239	268
9	296	325	353	382	411	439	468	497	525	554
101.0	582	611	640	668	697	726	754	783	812	840
1	869	898	926	955	984	*012	*041	*070	*098	*127
2	145.156	184	213	242	270	299	328	356	385	414
3	443	471	500	529	557	586	615	644	672	701
4	730	759	787	816	845	874	902	931	960	989
5	146.017	046	075	104	133	161	190	219	248	277
6	305	334	363	392	421	449	478	507	536	565
7	593	622	651	680	709	738	766	795	824	853
8	882	911	940	968	997	*026	*055	*084	*113	*142
9	147.171	199	228	257	286	315	344	373	402	431
102.0	460	489	517	546	575	604	633	662	691	720
1	749	778	807	836	865	894	923	952	980	*009
2	148.038	067	096	125	154	183	212	241	270	299
3	328	357	386	415	444	473	502	531	560	589
4	618	647	676	706	735	764	793	822	851	880
5	909	938	967	996	*025	*054	*083	*112	*141	*170
6	149.200	229	258	287	316	345	374	403	432	461
7	490	520	549	578	607	636	665	694	723	753
8	782	811	840	869	898	927	957	986	*015	*044
9	150.073	102	132	161	190	219	248	278	307	336
103.0	365	394	423	453	482	511	540	570	599	628
1	657	686	716	745	774	803	833	862	891	920
2	950	979	*008	*037	*067	*096	*125	*154	*184	*213
3	151.242	272	301	330	359	389	418	447	477	506
4	535	565	594	623	652	682	711	740	770	799
5	828	858	887	917	946	975	*005	*034	*063	*093
6	152.122	151	181	210	240	269	298	328	357	386
7	416	445	475	504	533	563	592	622	651	680
8	710	739	769	798	828	857	887	916	945	975
9	153.004	034	063	093	122	152	181	211	240	269
104.0	299	328	358	387	417	446	476	505	535	564
1	594	623	653	682	712	741	771	801	830	860
2	889	919	948	978	*007	*037	*066	*096	*126	*155
3	154.185	214	244	273	303	333	362	392	421	451
4	480	510	540	569	599	628	658	688	717	747
5	777	806	836	865	895	925	954	984	*014	*043
6	155.073	103	132	162	192	221	251	281	310	340
7	370	399	429	459	488	518	548	577	607	637
8	666	696	726	756	785	815	845	875	904	934
9	964	993	*023	*053	*083	*112	*142	*172	*202	*231
105.0	156.261	291	321	351	380	410	440	470	499	529
C	0	1	2	3	4	5	6	7	8	9

TANK TABLE, CONDENSED FORM

Inches	0' Bbls.	1' Bbls.	2' Bbls.	3' Bbls.	4' Bbls.	5' Bbls.	6' Bbls.	7' Bbls.	8' Bbls.	9' Bbls.
0"		79.41	157.85	235.22	311.56	386.89	461.14	534.31	606.49	677.70
1"	6.61	85.99	164.34	241.62	317.88	393.12	467.27	540.36	612.46	683.52
2"	13.22	92.56	170.82	248.01	324.19	399.34	473.40	546.41	618.43	689.32
3"	19.88	99.12	177.29	254.40	330.49	405.55	479.52	552.44	624.39	695.13
4"	26.52	105.68	183.76	260.78	336.79	411.76	485.64	558.48	630.34	700.92
5"	33.16	112.23	190.21	267.15	343.08	417.96	491.75	564.50	636.28	706.71
6"	39.79	118.77	196.66	273.52	349.36	424.15	497.85	570.52	642.22	712.49
7"	46.41	125.30	203.11	279.88	355.63	430.33	503.94	576.53	648.15	
8"	53.03	131.83	209.54	286.23	361.90	436.51	510.03	582.54	654.07	
9"	59.64	138.34	215.97	292.57	368.16	442.67	516.11	588.54	659.99	
10"	66.24	144.85	222.40	298.91	374.41	448.83	522.18	594.53	665.90	
11"	72.83	151.36	228.81	305.24	380.65	454.99	528.25	600.51	671.80	

Bbls. Fractions of Bbl. — Fractions of inch

FRACTIONS OF INCHES

Fractions of inch	0	1	2	3	4	5	6	7	8	9
1/8"	0.83	0.82	0.81	0.79	0.78	0.77	0.76	0.75	0.74	0.72
1/4"	1.65	1.63	1.61	1.59	1.57	1.55	1.52	1.50	1.48	1.45
3/8"	2.48	2.45	2.42	2.39	2.35	2.32	2.29	2.26	2.22	2.17
1/2"	3.31	3.27	3.22	3.18	3.14	3.09	3.05	3.01	2.97	2.90
5/8"	4.14	4.08	4.03	3.98	3.92	3.87	3.81	3.76	3.71	3.62
3/4"	4.96	4.90	4.83	4.77	4.71	4.64	4.57	4.51	4.45	4.35
7/8"	5.79	5.72	5.64	5.57	5.49	5.41	5.34	5.26	5.19	5.07

NOTE.—The above shows condensed form of tank table which has been sometimes used where the rate of taper is not too great. In the example given above the maximum error is about 4-100 bbls.

Table 4

Nominal diameter of pipe inches	External diameter inches	Bbls. displacement per 100 lineal feet	Timber dimensions	Bbls. displacement per 100 lineal feet
1 ″	1.31	0.1667	1″x 4″	0.4944
1¼″	1.66	0.2677	1″x 6″	0.7416
1½″	1.90	0.3507	1″x 8″	0.9888
2 ″	2.37	0.5456	1″x10″	1.2360
2½″	2.87	0.8002	1″x12″	1.4832
3 ″	3.5	1.1900	1″x14″	1.7304
3½″	4.0	1.5543	1″x16″	1.9776
4 ″	4.5	1.9671	2″x 4″	0.9888
4½″	5.0	2.4286	2″x 6″	1.4832
5 ″	5.56	3.0030	2″x 8″	1,9776
6 ″	6.62	4.2572	2″x10″	2.4720
8 ″	8.62	7.2181	2″x12″	2.9664
			6″x 6″	4.4496

Cubic inches, plus 3%, point off four decimal places, gives bbls. of 42 U. S. gallons, approximately.

Exactly 9702 cubic inches equal one bbl.

Diameter of cylinder in feet, squared, multiplied by 0.139875 gives bbls. per foot of length.
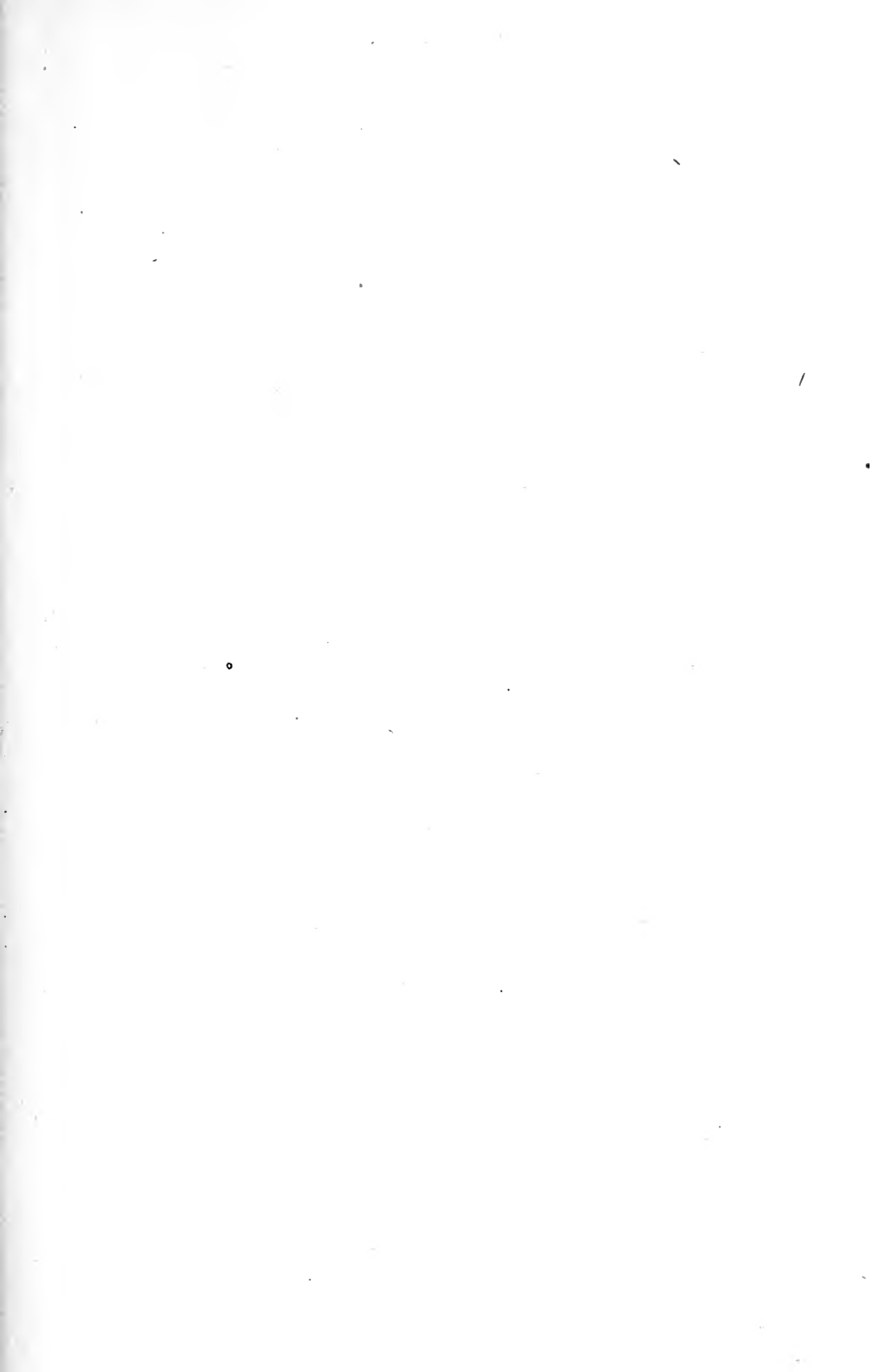
Cubic inches	Bbls.
10,000	1.030
1,000	0.103
100	0.010

Table 5

Thickness of staves inches	Difference between inside and outside circumferences feet	Thickness of staves inches	Difference between inside and outside circumferences feet
$\frac{7}{8}$″	0.46	$1\frac{15}{16}$″	1.01
$\frac{15}{16}$″	.49	2″ ″	1.05
1″ ″	.52	$\frac{1}{16}$″	1.08
$\frac{1}{16}$″	.56	$\frac{1}{8}$″	1.11
$\frac{1}{8}$″	.59	$\frac{3}{16}$″	1.15
$\frac{3}{16}$″	.62	$\frac{1}{4}$″	1.18
$\frac{1}{4}$″	.65	$\frac{5}{16}$″	1.21
$\frac{5}{16}$″	.69	$\frac{3}{8}$″	1.24
$\frac{3}{8}$″	.72	$\frac{7}{16}$″	1.28
$\frac{7}{16}$″	.75	$\frac{1}{2}$″	1.31
$\frac{1}{2}$″	.79	$\frac{9}{16}$″	1.34
$\frac{9}{16}$″	.82	$\frac{5}{8}$″	1.37
$\frac{5}{8}$″	.85	$\frac{11}{16}$″	1.41
$\frac{11}{16}$″	.88	$\frac{3}{4}$″	1.44
$\frac{3}{4}$″	.92	$\frac{13}{16}$″	1.47
$\frac{13}{16}$″	.95	$\frac{7}{8}$″	1.51
$\frac{7}{8}$″	.98	$\frac{15}{16}$″	1.54
		3″ ″	1.57