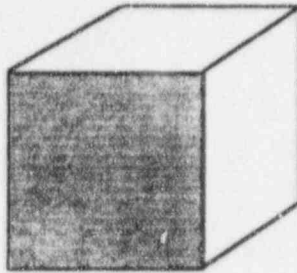


Amount of Water in Humid Air at any Pressure

'95 OCT 20 P4:50

OFFICE OF SECRETARY
DOCKETING & SERVICE
BRANCH

1 cubic foot of humid air

At Any Pressure

Dewpoint Temp. F	Vapor Pressure Water (in. Hg.) *
95	1.66
90	1.42
86	1.25
80	1.03
60	.522
50	.362
35	.204

EQUATIONS FROM EGG MANUAL SECTION 7 :

Parts Per Million by Volume = PPM_V

$$\text{PPM}_V = \frac{\text{Partial pressure H}_2\text{O vapor}}{\text{Partial Pressure of Dry Air}} \times 10^6$$

* Perry's Chemical
Engineer's Hdbk.
Fourth Edition

Partial pressure Water Vapor = Vapor pressure of Water at given temperature

Partial Pressure Dry Air = Total pressure - Vapor Pressure of Water at given Temp.

Parts Per Million by Weight = PPM_W

$$\text{PPM}_W = \text{PPM}_V \times \frac{\text{Mol wt. of H}_2\text{O}}{\text{Mol. Wt. Air}}$$

9601220295 950919
PDR ADOCK 05000424
G PDR

NUCLEAR REGULATORY COMMISSION

Docket No. 50-424/425-OLA-3 EXHIBIT NO. H-262

In the matter of Georgia Power Co. et al., Vogtle Units 1 & 2

☐ Staff ☐ Applicant ☒ Intervenor ☐ Other☐ Identified ☒ Received ☐ Rejected Reporter SD

Date 9/19/95 Witness HILL and WARD

SECTION 7

GENERAL DEW POINT MEASUREMENT INFORMATION

basic humidity definitions

DALTON'S LAW

John Dalton was the first to surmise that the total pressure, p_m , exerted by a mixture of gases or vapors is the sum of the pressures of each gas if it were to occupy the same volume by itself. The pressure which each gas component of a multiple constituent gas (such as air) exerts is called its partial pressure. If p_x , p_y , and p_z represent the respective partial pressures of gases X, Y, and Z in a mixture, Dalton's Law states:

$$p_m = p_x + p_y + p_z + \dots$$

Elementary as it may seem, the concept of Dalton's Law is often overlooked in considering problems in humidity, because one forgets that the "water" in a gas is actually a gas itself and must be treated in accordance with the gas laws. Air must be considered a mixture of gases - oxygen, nitrogen, and water vapor (neglecting the minor constituents). All discussions of humidity can then be reduced to discussions of water vapor pressure, and all definitions encountered in humidity can be expressed in terms of vapor pressure.

DEW POINT

Dew Point is that unique temperature to which the air (or any gas) must be cooled in order that it shall be saturated with respect to water.

FROST POINT

Frost Point is that unique temperature to which the air (or any gas) must be cooled in order that it shall be saturated with respect to ice.

The dew point or frost point DEFINES the partial pressure of the water vapor in the gas, from the Smithsonian Meteorological Tables.

RELATIVE HUMIDITY

Relative Humidity is the ratio of the actual vapor pressure (as defined by the Tables) in the mixture to the saturation vapor pressure, with respect to water, at the prevailing dry bulb temperature.

Example 1. (Metric Units)

If dew point = 10°C and dry bulb = 25°C :

$$\begin{aligned} RH &= \frac{\text{Vapor Pressure at } 10^{\circ}\text{C}}{\text{Vapor Pressure at } 25^{\circ}\text{C}} \\ &= \frac{12.272 \text{ mb}}{31.671 \text{ mb}} = 38.7\% \end{aligned}$$

If frost point = -45°C
and dry bulb = -40°C :

$$\begin{aligned} RH &= \frac{\text{Vapor Pressure at } -45^{\circ}\text{C (Actual)}}{\text{Vapor Pressure at } -40^{\circ}\text{C}} \\ &\quad \text{(with respect to water)} \\ &= \frac{0.07198 \text{ mb}}{0.1891 \text{ mb}} = 38.1\% \end{aligned}$$

Example 2. (English Units)

If dew point = 50°F and dry bulb = 90°F :

$$\begin{aligned} RH &= \frac{\text{Vapor Pressure at } 50^{\circ}\text{F}}{\text{Vapor Pressure at } 90^{\circ}\text{F}} \\ &= \frac{.3624'' \text{ Hg}}{1.422'' \text{ Hg}} = 25.5\% \end{aligned}$$

If frost point = -50°F
and dry bulb = -40°F :

$$\begin{aligned} RH &= \frac{\text{Vapor Pressure at } -50^{\circ}\text{F (Actual)}}{\text{Vapor Pressure at } -40^{\circ}\text{F}} \\ &\quad \text{(with respect to water)} \\ &= \frac{1.990 \times 10^{-3}'' \text{ Hg}}{5.584 \times 10^{-3}'' \text{ Hg}} = 35.7\% \end{aligned}$$

NOTE: RH is arbitrarily defined with respect to water even though it seems that it should be with respect to ice at -40°C (-40°F).

PPM BY VOLUME

Parts per million (PPM) by volume is the ratio of the partial pressure of the water vapor to the partial pressure of the dry gas.

Example 1. (Metric Units)

If frost point = -60°C and system total pressure is 1013 mb (14.7 PSIA)

$$\begin{aligned} \text{PPM}_v &= \frac{\text{Parts}}{\text{Million}} \\ &= \frac{\text{Vapor Pressure at } -60^{\circ}\text{C}}{\text{Total Pressure} - \text{Water Vapor Pressure at } -60^{\circ}\text{C}} \\ &= \frac{10.80 \times 10^{-3} \text{ mb}}{(1013 - 10.80 \times 10^{-3}) \text{ mb}} \times 10^6 \\ &= 10.7 \text{ PPM (by volume)} \end{aligned}$$

Example 2. (English Units)

If frost point = -70°F and system total pressure is 14.7 PSIA (29.92''Hg):

$$\begin{aligned} \text{PPM}_v &= \frac{\text{Parts}}{\text{Million}} \\ &= \frac{\text{Vapor Pressure at } -70^{\circ}\text{F}}{\text{Total Pressure} - \text{Water Vapor Pressure at } -70^{\circ}\text{F}} \times 10^6 \\ &= \frac{4.974 \times 10^{-4}'' \text{ Hg}}{(29.92 - .004974)'' \text{ Hg}} \times 10^6 \\ &= 17 \text{ PPM (by volume)} \end{aligned}$$



PPM BY WEIGHT

PPM by weight of dry gas is identical to PPM by volume except that the weight ratio changes with the molecular weight of the carrier gas.

Example 1. (Metric Units)

If frost point = -60°C , system total pressure is 1013 mb, and the carrier gas is hydrogen:

$$\begin{aligned} \text{PPM}_w &= \text{PPM}_v \times \frac{\text{Mol. wt. of H}_2\text{O}}{\text{Mol. wt. of carrier gas}} \\ &= 10.7 \times \frac{18}{2} = 96.3\text{PPM} \\ &\quad \text{(by weight)} \end{aligned}$$

Example 2. (English Units)

If frost point = -70°F , system total pressure is 14.7 PSIA, and the carrier gas is hydrogen:

$$\begin{aligned} \text{PPM}_w &= \text{PPM}_v \times \frac{\text{Mol. wt. of H}_2\text{O}}{\text{Mol. wt. of carrier gas}} \\ &= 17 \times \frac{18}{2} = 153\text{PPM} \\ &\quad \text{(by weight)} \end{aligned}$$

MOLECULAR WEIGHT OF COMMON GASES

Acetylene	26	Helium	4
Air	29	Hydrogen	2
Ammonia	17	Methane	16
Argon	40	Nitrogen	28
CO ₂	44	Oxygen	32
CO	28	Sulfur Dioxide	64
Ethylene	28	Water	18

DEW POINT/FROST POINT RELATIONSHIPS

Below 0°C (32°F), dew point hygrometers measure the frost point temperature rather than the dew point. The tables below permit conversion from dew to frost point. For a more accurate conversion, consult Table 102 of Smithsonian Meteorological Tables.

Metric Units ($^{\circ}\text{C}$)

F.P.	D.P.	F.P.	D.P.	F.P.	D.P.	F.P.	D.P.
0	0	-12	-13.4	-24	-26.6	-36	-39.4
-1	-1.2	-13	-14.5	-25	-27.7	-37	-40.5
-2	-2.3	-14	-15.6	-26	-28.8	-38	-41.6
-3	-3.4	-15	-16.7	-27	-29.9	-39	-42.6
-4	-4.5	-16	-17.8	-28	-30.9	-40	-43.7
-5	-5.6	-17	-18.9	-29	-32.0	-41	-44.7
-6	-6.8	-18	-20.0	-30	-33.0	-42	-45.8
-7	-7.9	-19	-21.1	-31	-34.1	-43	-46.8
-8	-9.0	-20	-22.2	-32	-35.2	-44	-47.9
-9	-10.1	-21	-23.3	-33	-36.2	-45	-49.0
-10	-11.2	-22	-24.4	-34	-37.3	-46	-50.0
-11	-12.3	-23	-25.5	-35	-38.4		

English Units ($^{\circ}\text{F}$)

F.P.	D.P.	F.P.	D.P.	F.P.	D.P.	F.P.	D.P.
+32	+32	+10	+7.4	-12	-16.7	-34	-40.3
+31	+30.8	+9	+6.3	-13	-17.8	-35	-41.4
+30	+29.7	+8	+5.2	-14	-18.9	-36	-42.4
+29	+28.6	+7	+4.1	-15	-20.0	-37	-43.5
+28	+27.5	+6	+2.9	-16	-21.1	-38	-44.5
+27	+26.4	+5	+1.8	-17	-22.2	-39	-45.6
+26	+25.2	+4	+0.7	-18	-23.3	-40	-46.6
+25	+24.1	+3	-0.4	-19	-24.3	-41	-47.7
+24	+22.9	+2	-1.5	-20	-25.4	-42	-48.7
+23	+21.8	+1	-2.6	-21	-26.4	-43	-49.8
+22	+20.7	0	-3.7	-22	-27.5	-44	-50.8
+21	+19.6	-1	-4.8	-23	-28.6	-45	-51.9
+20	+18.5	-2	-5.8	-24	-29.6	-46	-52.9
+19	+17.4	-3	-6.9	-25	-30.6	-47	-54.0
+18	+16.2	-4	-8.0	-26	-31.7	-48	-55.0
+17	+15.1	-5	-9.1	-27	-32.8	-49	-56.1
+16	+14.0	-6	-10.2	-28	-33.9	-50	-57.1
+15	+12.9	-7	-11.3	-29	-35.0	-51	-58.2
+14	+11.8	-8	-12.4	-30	-36.1	-52	-59.2
+13	+10.7	-9	-13.5	-31	-37.2	-53	-60.3
+12	+9.6	-10	-14.6	-32	-38.2		
+11	+8.5	-11	-15.6	-33	-39.3		

REFERENCE: Smithsonian Meteorological Tables, Sixth Revised Edition, List, Robert J., Publication No. 4014, Smithsonian Institution, Washington, D.C.

Table 15-1. Thermodynamic Properties of Moist Air (Standard Atmospheric Pressure, 29.921 in. Hg)

Temp. t, °F.	Saturation humidity H _s × 10 ³	Volume, cu. ft./lb. dry air			Enthalpy, B.t.u./lb. dry air			Entropy, B.t.u./°F.(lb. dry air)			Condensed water			Temp. t, °F.
		v _g	v _{sa}	v _a	h _g	h _{sa}	h _a	s _g	s _{sa}	s _a	Enthalpy, B.t.u./lb. h _{sw}	Entropy, B.t.u./ (lb.)°F. s _{sw}	Vapor press., in. Hg p _s × 10 ³	
-160	0.2120	7.520	0.000	7.520	-38.504	0.000	-38.504	-0.10300	0.00000	-0.10300	-222.00	-0.4907	0.1009	-160
-155	0.3867	7.647	0.000	7.647	-37.296	0.000	-37.296	-0.09901	0.00000	-0.09901	-220.40	-0.4853	1.842	-155
-150	0.6932	7.775	0.000	7.775	-36.088	0.000	-36.088	-0.09508	0.00000	-0.09508	-218.77	-0.4800	3.301	-150
-145	1.219	7.902	0.000	7.902	-34.881	0.000	-34.881	-0.09121	0.00000	-0.09121	-217.12	-0.4747	5.807	-145
-140	2.109	8.029	0.000	8.029	-33.674	0.000	-33.674	-0.08740	0.00000	-0.08740	-215.44	-0.4695	1.0E-4	-140
-135	3.586	8.156	0.000	8.156	-32.468	0.000	-32.468	-0.08365	0.00000	-0.08365	-213.75	-0.4642	1.707	-135
-130	6.000	8.283	0.000	8.283	-31.262	0.000	-31.262	-0.07997	0.00000	-0.07997	-212.03	-0.4590	2.858	-130
H _s × 10 ³														
-125	0.9887	8.411	0.000	8.411	-30.057	0.000	-30.057	-0.07634	0.00000	-0.07634	-210.28	-0.4533	0.4710	-125
-120	1.606	8.537	0.000	8.537	-28.852	0.000	-28.852	-0.07277	0.00000	-0.07277	-208.52	-0.4485	7.653	-120
-115	2.571	8.664	0.000	8.664	-27.648	0.000	-27.648	-0.06924	0.00000	-0.06924	-206.73	-0.4433	1.226	-115
-110	4.063	8.792	0.000	8.792	-26.444	0.000	-26.444	-0.06577	0.00000	-0.06577	-204.92	-0.4381	1.939	-110
-105	6.340	8.919	0.000	8.919	-25.240	0.001	-25.239	-0.06234	0.00000	-0.06234	-203.09	-0.4329	3.026	-105
-100	9.772	9.046	0.000	9.046	-24.037	0.001	-24.036	-0.05897	0.00000	-0.05897	-201.23	-0.4277	4.666	-100
H _s × 10 ³														
-95	1.489	9.173	0.000	9.173	-22.835	0.002	-22.833	-0.05565	0.00000	-0.05565	-199.35	-0.4225	0.7111	-95
-90	2.242	9.300	0.000	9.300	-21.631	0.002	-21.629	-0.05237	0.00001	-0.05236	-197.44	-0.4173	1.071	-90
-85	3.342	9.426	0.000	9.426	-20.428	0.003	-20.425	-0.04913	0.00001	-0.04912	-195.51	-0.4121	1.597	-85
-80	4.930	9.553	0.000	9.553	-19.225	0.005	-19.220	-0.04595	0.00001	-0.04594	-193.55	-0.4069	2.356	-80
-75	7.196	9.680	0.000	9.680	-18.022	0.007	-18.015	-0.04280	0.00002	-0.04278	-191.57	-0.4017	3.441	-75
-70	10.40	9.806	0.000	9.806	-16.820	0.011	-16.809	-0.03969	0.00003	-0.03966	-189.56	-0.3965	4.976	-70
-65	14.91	9.932	0.000	9.932	-15.617	0.015	-15.602	-0.03663	0.00005	-0.03658	-187.53	-0.3913	7.130	-65
H _s × 10 ³														
-60	2.118	10.059	0.000	10.059	-14.416	0.022	-14.394	-0.03360	0.00006	-0.03354	-185.47	-0.3861	1.0127	-60
-55	2.982	10.186	0.000	10.186	-13.214	0.031	-13.183	-0.03061	0.00009	-0.03052	-183.39	-0.3810	1.4258	-55
-50	4.163	10.313	0.001	10.314	-12.012	0.043	-11.969	-0.02766	0.00012	-0.02754	-181.29	-0.3758	1.9910	-50
-45	5.766	10.440	0.001	10.441	-10.811	0.060	-10.751	-0.02474	0.00015	-0.02459	-179.16	-0.3707	2.7578	-45
-40	7.925	10.566	0.001	10.567	-9.609	0.083	-9.526	-0.02186	0.00021	-0.02165	-177.01	-0.3655	3.7906	-40
-35	10.81	10.693	0.002	10.695	-8.408	0.113	-8.295	-0.01902	0.00028	-0.01874	-174.84	-0.3604	5.1713	-35
H _s × 10 ³														
-30	1.464	10.820	0.002	10.822	-7.207	0.154	-7.053	-0.01621	0.00038	-0.01583	-172.64	-0.3552	0.70046	-30
-25	1.969	10.946	0.004	10.950	-6.005	0.207	-5.798	-0.01342	0.00051	-0.01291	-170.42	-0.3500	9.4212	-25
-20	2.630	11.073	0.005	11.078	-4.804	0.277	-4.527	-0.01067	0.00068	-0.01009	-168.17	-0.3449	1.7587	-20
-15	3.491	11.200	0.006	11.206	-3.603	0.368	-3.235	-0.00796	0.00089	-0.00707	-165.90	-0.3398	1.6706	-15
-10	4.606	11.326	0.008	11.334	-2.402	0.487	-1.915	-0.00529	0.00115	-0.00414	-163.60	-0.3346	2.2035	-10
-5	6.040	11.452	0.011	11.463	-1.201	0.639	-0.562	-0.00263	0.00149	-0.00114	-161.28	-0.3295	2.8866	-5
H _s × 10 ³														
0	0.7872	11.578	0.015	11.593	0.000	0.835	0.835	0.00000	0.00192	0.00192	-158.93	-0.3244	3.7645	0
5	1.020	11.705	0.019	11.724	1.201	1.085	2.286	0.00260	0.00246	0.00506	-156.57	-0.3193	4.8779	5
10	1.315	11.831	0.025	11.856	2.402	1.401	3.803	0.00518	0.00314	0.00832	-154.17	-0.3141	6.2858	10
15	1.667	11.958	0.032	11.990	3.603	1.800	5.403	0.00772	0.00399	0.01171	-151.76	-0.3090	8.0565	15
20	2.152	12.084	0.042	12.126	4.804	2.302	7.106	0.01023	0.00504	0.01527	-149.31	-0.3039	10.272	20
25	2.733	12.211	0.054	12.265	6.005	2.929	8.934	0.01273	0.00635	0.01908	-146.85	-0.2988	13.032	25
30	3.454	12.338	0.068	12.406	7.206	3.709	10.915	0.01519	0.00796	0.02315	-144.36	-0.2936	16.452	30
32*	3.788	12.388	0.075	12.463	7.686	4.072	11.758	0.01617	0.00870	0.02487	-143.36	-0.2916	18.035	32
32*	3.788	12.388	0.075	12.463	7.686	4.072	11.758	0.01617	0.00870	0.02487	0.04	0.0000	18.037	32*
34	4.107	12.438	0.082	12.520	8.167	4.418	12.585	0.01715	0.00940	0.02655	2.06	0.0041	19.546	34
p _s														
36	4.450	12.489	0.089	12.578	8.647	4.791	13.438	0.01812	0.01016	0.02828	4.07	0.0081	0.21166	36
38	4.818	12.540	0.097	12.637	9.128	5.191	14.319	0.01909	0.01097	0.03006	6.08	0.0122	2.2904	38
40	5.213	12.590	0.105	12.695	9.608	5.622	15.230	0.02005	0.01183	0.03188	8.09	0.0162	2.4767	40
42	5.638	12.641	0.114	12.755	10.088	6.084	16.172	0.02101	0.01275	0.03376	10.09	0.0202	2.6763	42
44	6.091	12.691	0.124	12.815	10.569	6.580	17.149	0.02197	0.01373	0.03570	12.10	0.0242	2.8899	44
46	6.578	12.742	0.134	12.876	11.049	7.112	18.161	0.02293	0.01478	0.03771	14.10	0.0282	3.1185	46
48	7.100	12.792	0.146	12.938	11.530	7.681	19.211	0.02387	0.01591	0.03978	16.11	0.0321	3.3629	48
50	7.658	12.843	0.158	13.001	12.010	8.291	20.301	0.02481	0.01711	0.04192	18.11	0.0361	3.6240	50
52	8.256	12.894	0.170	13.064	12.491	8.945	21.436	0.02575	0.01839	0.04414	20.11	0.0400	3.9028	52
54	8.894	12.944	0.185	13.129	12.971	9.644	22.615	0.02669	0.01976	0.04645	22.12	0.0439	4.2004	54
56	9.575	12.995	0.200	13.195	13.452	10.39	23.84	0.02762	0.02121	0.04883	24.12	0.0478	4.5176	56
58	10.30	13.045	0.216	13.261	13.932	11.19	25.12	0.02855	0.02276	0.05131	26.12	0.0517	4.8558	58
60	11.08	13.096	0.233	13.329	14.413	12.05	26.46	0.02948	0.02441	0.05389	28.12	0.0555	5.2159	60
62	11.91	13.147	0.251	13.398	14.893	12.96	27.85	0.03040	0.02616	0.05636	30.12	0.0594	5.5994	62
64	12.80	13.197	0.271	13.468	15.374	13.94	29.31	0.03132	0.02803	0.05935	32.12	0.0632	6.0073	64
66	13.74	13.247	0.292	13.539	15.855	14.98	30.83	0.03223	0.03002	0.06225	34.11	0.0670	6.4411	66
68	14.75	13.298	0.315	13.613	16.335	16.09	32.42	0.03314	0.03213	0.06527	36.11	0.0708	6.9019	68
H _s × 10 ³														
70	1.582	13.348	0.330	13.687	16.816	17.27	34.09	0.03405	0.03437	0.06842	38.11	0.0746	7.3915	70
72	1.697	13.398	0.364	13.762	17.297	18.53	35.83	0.03495	0.03675	0.07170	40.11	0.0784	7.9112	72
74	1.819	13.449	0.392	13.841	17.778	19.88	37.66	0.03585	0.03928	0.07513	42.10	0.0821	8.4624	74
76	1.948	13.499	0.422	13.921	18.259	21.31	39.57	0.03675	0.04197	0.07872	44.10	0.0859	9.0470	76
78	2.086	13.550	0.453	14.003	18.740	22.84	41.58	0.03765	0.04482	0.08247	46.10	0.0896	9.6665	78

Compiled by John A. Goff and S. Gratch. See also Keenan and Kaye, "Thermodynamic Properties of Air," Wiley, New York, 1945.

Enthalpy of dry air taken as zero at 0°F. Enthalpy of liquid water taken as zero at 32°F.

* Extrapolated to represent metastable equilibrium with undercooled liquid.

Table 15-1. Thermodynamic Properties of Moist Air (Standard Atmospheric Pressure, 29.921 in. Hg) — (Continued)

Temp. <i>t</i> , °F.	Saturation humidity <i>H_s</i> × 10 ³	Volume, cu. ft./lb. dry air			Enthalpy, B.t.u./lb. dry air			Entropy, B.t.u./°F. (lb. dry air)			Condensed water			Temp. <i>t</i> , °F.
		<i>v_a</i>	<i>v_{a+s}</i>	<i>v_s</i>	<i>h_a</i>	<i>h_{a+s}</i>	<i>h_s</i>	<i>s_a</i>	<i>s_{a+s}</i>	<i>s_s</i>	Enthalpy B.t.u./lb. <i>h_w</i>	Entropy, B.t.u./ (lb.) (°F.) <i>s_w</i>	Vapor press., in. Hg <i>p_s</i>	
80	2.233	13.601	0.486	14.087	19.221	24.47	43.69	0.03854	0.04784	0.08638	48.10	0.0933	1.0323	80
82	2.389	13.651	.523	14.174	19.702	26.20	45.90	0.03943	.05105	.09048	50.09	.0970	1.1017	82
84	2.555	13.702	.560	14.262	20.183	28.04	48.22	0.04031	.05446	.09477	52.09	.1007	1.1752	84
86	2.731	13.752	.602	14.354	20.663	30.00	50.66	0.04119	.05807	.09926	54.08	.1043	1.2529	86
88	2.919	13.803	.645	14.448	21.144	32.09	53.23	0.04207	.06189	.10396	56.08	.1080	1.3351	88
90	3.118	13.853	.692	14.545	21.625	34.31	55.93	0.04295	.06596	.10890	58.08	.1116	1.4219	90
92	3.330	13.904	.741	14.645	22.106	36.67	58.78	0.04382	.07025	.11407	60.07	.1153	1.5155	92
94	3.556	13.954	.795	14.749	22.587	39.18	61.77	0.04469	.07480	.11949	62.07	.1188	1.6102	94
96	3.795	14.005	.851	14.856	23.068	41.85	64.92	0.04556	.07963	.12519	64.06	.1224	1.7123	96
98	4.049	14.056	.911	14.967	23.548	44.68	68.23	0.04643	.08474	.13117	66.06	.1260	1.8199	98
100	4.319	14.106	.975	15.081	24.029	47.70	71.73	0.04729	.09016	.13745	68.06	.1296	1.9333	100
102	4.606	14.157	1.043	15.200	24.510	50.91	75.42	0.04815	.09591	.14406	70.05	.1332	2.0528	102
104	4.911	14.207	1.117	15.324	24.991	54.32	79.31	0.04900	.10201	.15101	72.05	.1367	2.1786	104
<i>H_s</i> × 10														
106	0.5234	14.258	1.194	15.452	25.472	57.95	83.42	0.04985	.10851	.1584	74.04	.1403	2.3109	106
108	5.578	14.308	1.278	15.586	25.953	61.80	87.76	0.05070	.1153	.1660	76.04	.1438	2.4502	108
110	5.944	14.359	1.365	15.724	26.434	65.91	92.34	0.05155	.1226	.1742	78.03	.1472	2.5966	110
112	6.333	14.409	1.460	15.869	26.915	70.27	97.18	0.05239	.1302	.1826	80.03	.1508	2.7505	112
114	6.746	14.460	1.560	16.020	27.397	74.91	102.31	0.05323	.1384	.1916	82.03	.1543	2.9123	114
116	7.185	14.510	1.668	16.178	27.878	79.85	107.73	0.05407	.1470	.2011	84.02	.1577	3.0821	116
118	7.652	14.561	1.782	16.343	28.359	85.10	113.46	0.05490	.1562	.2111	86.02	.1612	3.2603	118
120	8.149	14.611	1.905	16.516	28.841	90.70	119.54	0.05573	.1659	.2216	88.01	.1646	3.4474	120
122	8.678	14.662	2.034	16.696	29.322	96.66	125.98	0.05656	.1763	.2329	90.01	.1681	3.6436	122
124	9.242	14.712	2.174	16.886	29.804	103.0	132.8	0.05739	.1872	.2446	92.01	.1715	3.8493	124
126	9.841	14.763	2.323	17.086	30.285	109.8	140.1	0.05821	.1989	.2571	94.01	.1749	4.0649	126
128	1.048	14.813	2.482	17.295	30.766	117.0	147.8	0.05903	.2113	.2703	96.00	.1783	4.2907	128
130	1.116	14.864	2.652	17.516	31.248	124.7	155.9	0.05985	.2245	.2844	98.00	.1817	4.5272	130
132	1.189	14.915	2.834	17.749	31.729	133.0	164.7	0.06067	.2386	.2993	100.00	.1851	4.7747	132
134	1.267	14.965	3.029	17.994	32.211	141.8	174.0	0.06148	.2536	.3151	102.00	.1885	5.0337	134
136	1.350	15.016	3.237	18.253	32.692	151.2	183.9	0.06229	.2695	.3318	104.00	.1918	5.3046	136
138	1.439	15.066	3.462	18.528	33.174	161.2	194.4	0.06310	.2865	.3496	106.00	.1952	5.5878	138
<i>H_s</i>														
140	0.1534	15.117	3.702	18.819	33.655	172.0	205.7	0.06390	.3047	.3686	107.99	.1985	5.8838	140
142	1.636	15.167	3.963	19.128	34.136	183.6	217.7	0.06470	.3241	.3888	109.99	.2018	6.1930	142
144	1.745	15.218	4.239	19.457	34.618	196.0	230.6	0.06549	.3449	.4104	111.99	.2051	6.5160	144
146	1.862	15.268	4.539	19.807	35.099	209.3	244.4	0.06629	.3672	.4335	113.99	.2084	6.8532	146
148	1.989	15.319	4.862	20.181	35.581	223.7	259.3	0.06708	.3912	.4583	115.99	.2117	7.2051	148
150	2.125	15.369	5.211	20.580	36.063	239.2	275.3	0.06787	.4169	.4848	117.99	.2150	7.5722	150
152	2.271	15.420	5.587	21.007	36.545	255.9	292.4	0.06866	.4445	.5132	119.99	.2183	7.9550	152
154	2.430	15.470	5.996	21.466	37.026	273.9	310.9	0.06945	.4743	.5438	121.99	.2216	8.3541	154
156	2.602	15.521	6.439	21.960	37.508	293.5	331.0	0.07023	.5066	.5768	123.99	.2248	8.7701	156
158	2.788	15.571	6.922	22.493	37.990	314.7	352.7	0.07101	.5415	.6125	125.99	.2281	9.2036	158
160	2.990	15.622	7.446	23.068	38.472	337.8	376.3	0.07179	.5793	.6511	128.00	.2313	9.6556	160
162	3.211	15.672	8.020	23.692	38.954	363.0	402.0	0.07257	.6204	.6930	130.00	.2345	10.125	162
164	3.452	15.723	8.648	24.371	39.436	390.5	429.9	0.07334	.6652	.7385	132.00	.2377	10.614	164
166	3.716	15.773	9.339	25.112	39.918	420.8	460.7	0.07411	.7142	.7883	134.00	.2409	11.123	166
168	4.007	15.824	10.093	25.922	40.400	454.0	494.4	0.07488	.7680	.8429	136.01	.2441	11.652	168
170	4.327	15.874	10.938	26.812	40.882	490.6	531.5	0.07565	.8273	.9030	138.01	.2473	12.203	170
172	4.682	15.925	11.870	27.795	41.364	531.3	572.7	0.07641	.8927	.9691	140.01	.2505	12.775	172
174	5.078	15.975	12.911	28.886	41.846	576.5	618.3	0.07718	.9654	1.0426	142.02	.2537	13.369	174
176	5.519	16.026	14.074	30.100	42.328	627.1	669.4	0.07794	1.047	1.125	144.02	.2568	13.987	176
178	6.016	16.076	15.386	31.462	42.810	684.1	726.9	0.07870	1.137	1.216	146.03	.2600	14.628	178
180	6.578	16.127	16.870	32.997	43.292	748.5	791.8	0.07946	1.240	1.319	148.03	.2631	15.294	180
182	7.218	16.177	18.565	34.742	43.773	821.9	865.7	0.08021	1.357	1.437	150.04	.2662	15.985	182
184	7.953	16.228	20.513	36.741	44.257	906.2	950.5	0.08096	1.490	1.571	152.04	.2693	16.702	184
186	8.805	16.278	22.775	39.053	44.740	1004	1049	0.08171	1.645	1.727	154.05	.2724	17.446	186
188	9.802	16.329	25.427	41.756	45.222	1119	1164	0.08245	1.825	1.907	156.06	.2755	18.217	188
190	1.099	16.379	28.580	44.959	45.704	1255	1301	0.08320	2.039	2.122	158.07	.2786	19.017	190
192	1.241	16.430	32.375	48.805	46.187	1418	1464	0.08394	2.296	2.380	160.07	.2817	19.845	192
194	1.416	16.480	37.036	53.516	46.670	1619	1666	0.08468	2.609	2.694	162.08	.2848	20.704	194
196	1.635	16.531	42.885	59.416	47.153	1871	1918	0.08542	3.002	3.087	164.09	.2879	21.594	196
198	1.917	16.581	50.426	67.007	47.636	2195	2243	0.08616	3.507	3.593	166.10	.2910	22.514	198
200	2.295	16.632	60.510	77.142	48.119	2629	2677	0.08689	4.179	4.266	168.11	.2940	23.468	200