

Monsanto

Physical Chemistry
Special Study 71-3
Job No. 1348022

FROM (NAME & LOCATION)

~~F. M. Emery - Technology Department - S. Second St. - St. Louis~~

DATE January 22, 1971
SUBJECT COMPOSITION OF COMPETITIVE POLY-
CHLORINATED BIPHENYL PRODUCTS
REFERENCE Memo, R. E. Keller to A. F. Regan,
11-5-70
TO : R. E. Keller
Res. 1

cc H. S. Bergen - GO
W. B. Papageorge - GO
W. R. Richard - GO
R. H. Munch - Res. 2
E. S. Tucker - Res. 2
M. W. Dietrich - Res. 2
R. A. Baxter/H. S. Vodden/
R. A. Lidgett - Ruabon
A. F. Regan - Newport
D. Danna - GO
P. G. Benignus - GO

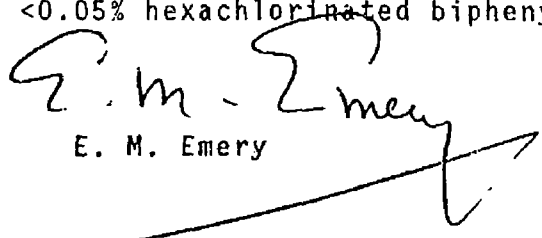
CONFIDENTIAL

This is a follow-up to the reference memo for the purpose of reporting the results of chlorinated biphenyl isomer analyses on nine additional competitive products. The new samples were analyzed on the very same GC column and instrument used for the 11-5-70 analyses.

The results reported on 11-5-70 were calculated using electronic digital integration for measuring the individual peak areas. Further work on this system has shown that the automatic electronic integrator (Infotronics CRS-100) gives low results on the late eluting peaks (5 and 6 chlorines) which tend to be low and broad. The electronic integrator does not detect these peaks soon enough to properly measure the complete peak. Therefore, the very same analyses done in November have been recalculated using mechanical disc integrator measurements wherein the analyst draws the base line and decides upon the point of peak end. This method of peak integration is more laborious, but gives more correct measurements in the case of low, broad peaks.

The recalculated values along with the new analyses are presented in Tables I and II in the same manner as given in the reference memo. As a check, the very same bottle of Sample No. 5 (Bayer Clophen 14057) analyzed in November was reanalyzed as Sample No. 16 in the current analyses. The two sets of values on this sample check quite well within the expected variability of such a complex analysis.

The results show that Monsanto, MCL and all the competitive PCB products including Prodelec 1499 and 1500 contain from 3.9 to 8.7% penta- and 0.3 to 2.2% hexachlorinated biphenyls. However, the new MCS 1016 (Aroclor 1242 distilled to remove high boilers) shows only 0.8% penta- and <0.05% hexachlorinated biphenyls.


E. M. Emery

db
Attach.

DSW 159031

STLCOPCB4040729

TABLE I

Sample Analyses Reported
11-15-70 Recalculated
with Disc Integrator
(to correct for errors
in electronic integra-
tion of 5 & 6 chlorine
isomers)

	Weight % of Chlorinated Biphenyls						
	Number of Chlorine Atoms						
	0	1	2	3	4	5	6
1) Aroclor 1242, Made at WGK - 3/9/70	0.01	0.7	15.5	49.4	24.8	8.7	0.85
2) Aroclor 1242 E-18, made in Great Britain 7/21/70	0.01	0.04	13.0	56.4	22.8	7.4	0.34
3) MCS-1016*	0.02	1.0	19.7	57.3	21.2	0.8	<0.05
4) Kaneclor KC 300	0	0	10.8	58.0	23.9	7.0	0.30
5) Bayer Clophen (14057)	0	0.02	18.3	58.5	16.2	5.1	1.9
6) Prodelec Superad	0	0	12.1	58.8	21.5	7.1	0.45
New Analyses Completed 1-18-71 Calculated with Disc Integrator							
7) Pyralene 1499 (12/22/70)	0	0	12.0	59.1	22.4	5.9	0.6
8) Pyralene 1499 (N 70/729)	0	0.1	17.0	55.2	21.7	5.5	0.5
9) Pyralene 1500 (J.D.S.)	0	0.4	43.9	30.0	16.6	7.9	1.2
10) Pyralene 1500 (12/22/70)	0.02	0.4	34.6	44.1	16.3	4.1	0.5
11) Pyralene 1500 (N 70/728)	0.02	0.4	37.0	42.8	15.5	3.9	0.4
12) Bayer Clophen A.30	0.02	0	16.8	58.4	18.0	4.9	1.9
13) Bayer Clophen A.30 (20198)	0	0.02	17.7	57.7	19.8	4.3	0.45
14) Bayer Clophen A.30 (20200)	0	0	16.5	58.6	19.3	5.0	0.6
15) Caffaro Apirollo 1431C	0	0	14.3	59.5	20.1	5.5	0.69
16) Bayer Clophen (14057)(Repeat)	0	0.05	17.6	57.9	16.5	5.7	2.2

*Aroclor 1242 distilled to remove high boilers

DSW 159032

STLCOPCB4040730

DETAILED SAMPLE IDENTIFICATIONS

(As written on bottles)

- 1) Aroclor 1242, Bottle 46, ABS #1, 3/9/70 WGK.
- 2) Aroclor 1242 E.18 Sample 8, #N701 9035, 7/21/70, made in Great Britain by Monsanto.
- 3) MCS 1016 1348560 Drum 1, 7/27/70 Pilot Plant.
- 4) Kaneclor KC 300, from Fujiken at June 70, for #III samples of P.G.B. letter of June 11, 1970.
- 5) Bayer-Clophen Trial Product 14057, OW7095012, 11K 8072/2 (contains epoxide additive, probably Der 332).
- 6) Prodelec Superad (6% Unox 206, Ex Dubilier condenser, from Peter Marsh, London.
- 7) Pyralene 1499 from Prodelec, dated 12/22/70.
- 8) Pyralene 1499 from Prodelec, N70/729.
- 9) Pyralene 1500 from Prodelec (J. D. Sullivan).
- 10) Pyralene 1500 from Prodelec, dated 12/22/70.
- 11) Pyralene 1500 from Prodelec, N70/728.
- 12) Bayer Clophen A.30.
- 13) Bayer Clophen A.30 Lot No. 20198.
- 14) Bayer Clophen A.30 Lot No. 20200.
- 15) Caffaro Apirollo 1431C.
- 16) Bayer-Clophen Trial Product 14057 (Repeat of 11/5/70 Analysis - Sample #5).

DSW 159033

PCB Meeting

3

Robert Reinert	U. S. Bur. of Commercial Fisheries Ann Arbor, Michigan
Matthew Zabik	Pesticide Research Center Michigan State University East Lansing, Michigan
Howard E. Johnson	Pesticide Research Center Michigan State University East Lansing, Michigan
Michael Gilbertson	Canada Centre for Inland Waters Burlington, Ontario
Michael E. Fox	Canada Centre for Inland Waters Burlington, Ontario
C. S. Hegre	National Marine Water Quality Lab. West Kingston, R. I.
J. F. Uthe	Fisheries Research Board of Canada Winnipeg, Manitoba
Robert E. Keller	Monsanto Company Organic Chemicals Division 1700 South Second Street St. Louis, MO 63177
William B. Papageorge	Monsanto Company 800 North Lindbergh Blvd. St. Louis, MO 63166
Jack T. Garrett	Monsanto Company 800 North Lindbergh Blvd. St. Louis, MO
Daniel W. Anderson	Dept. Wildlife Ecology University of Wisconsin Madison, Wisconsin
Louis Swaby	FWPCA, Washington, D.C.

DSW 162165

TABLE II

Concentration in Weight %

Retention Time (Min.)	No. of Chlorine Atoms	Peak Area Correction Factor	(1) A-1242 WGK	(2) A-1242 Gr. Britain	(3) MCS 1016	(4) Kaneclor KC 30	(5) Bayer Clophen	(6) Prodelac Superad	Retention Time From Spec. Special Study 69-3
9.6	0	.58	0.01	0.01	0.02	-	-	-	4.7
11.0	1	.71	0.54	0.04	0.7	-	0.02	-	7.6
12.3	1	.76	0.15	-	0.3	-	-	-	10.7
13.0	2	.93	3.4	2.5	4.2	1.7	3.9	2.2	11.6
14.0	2	.93	0.7	0.2	0.9	0.1	0.5	0.02	13.6
14.5	2	1.0	1.3	0.8	1.7	0.6	1.4	0.2	14.5
15.0	2	1.0	7.3	6.2	9.4	5.2	9.0	6.3	14.8
16.1	3	1.2	0.9	1.2	1.1	1.2	1.4	1.0	16.4
17.6	80%3	1.18	14.0	16.4	17.3	16.1	17.5	16.9	18.2
18.2	3	1.2	1.0	1.3	1.1	1.2	1.5	0.9	19.3
19.0	3	1.2	5.8	7.5	6.9	7.6	7.8	7.8	19.8
20.1	3	1.2	1.9	2.2	2.1	2.3	2.6	1.2	21.2
20.3	3	1.2	14.0	17.0	17.1	18.0	16.5	20.3	22.4
21.2	3	1.2	6.7	8.2	8.0	8.5	8.0	8.2	22.2
22.3	3	1.2	3.0	3.7	3.5	3.9	3.6	3.9	23.1
23.0	4	1.4	1.2	1.2	1.1	1.3	0.9	1.1	23.7
23.4	3	1.2	-	-	-	-	-	-	24.0
24.3	4	1.4	4.2	3.5	5.0	3.9	2.6	3.8	25.1
24.8	4	1.4	3.1	2.7	3.6	3.0	1.9	2.3	25.5
25.3	3&4	1.3	2.4	1.9	2.6	2.1	1.4	1.7	25.9
26.8	3	1.4	3.7	3.4	4.4	3.6	2.4	3.4	26.9
27.6	4	1.2	3.2	3.5	2.4	3.5	3.0	2.8	27.2
28.5	4	1.4	3.7	3.4	3.7	3.6	2.6	3.1	27.8
29.7	4	1.4	0.6	0.6	0.6	0.8	0.4	0.6	28.8
31.0	4	1.4	0.05	-	-	0.01	-	-	29.6
31.7	4	1.4	1.4	1.2	0.4	1.1	0.7	1.2	29.8
32.3	4	1.4	3.6	3.1	0.8	2.9	1.9	2.9	30.3
33.0	5	1.6	4.3	3.4	0.8	3.4	2.4	3.6	30.6
34.0	4	1.6	-	-	0.10	-	-	-	31.3
36.0	5	1.4	2.5	2.2	0.10	2.1	1.5	2.2	32.1
36.6	5	1.6	1.2	0.49	0.09	0.5	0.6	0.5	32.6
37.6	5	1.6	0.27	0.21	0.01	0.13	0.1	0.10	33.1
39.0	5	1.6	0.72	0.46	-	0.48	0.50	0.32	34.3
41.0	5	1.6	0.72	0.46	-	0.48	0.50	0.32	34.6
42.2	5	1.6	0.72	0.46	-	0.48	0.50	0.32	35.0
43.3	6	1.8	0.28	0.13	-	0.14	0.11	0.07	35.4
44.5	5	1.6	0.98	0.60	-	0.52	0.59	0.46	35.9
47.6	6	1.8	0.36	0.21	-	0.14	0.27	0.17	37.1
51.0	5	1.6	0.70	0.26	-	0.24	0.60	0.31	38.1
55.0	6	1.8	0.14	-	-	0.02	0.44	0.10	40.5
56.0	5	1.6	0.52	0.26	-	0.12	0.34	0.15	-
58.0	6	1.8	0.07	-	-	-	0.11	0.11	42.5

Retention Time (Min.)	No. of Chlorine Atoms	Peak Area Correction Factor	Concentration in Weight %				Page 2
			(7)	(8)	(9)	(10)	
			Pyralene 1499 (12/22/70)	Pyralene 1499 (N 70/729)	Pyralene 1500 (J.D.S.)	Pyralene 1500 (12/22/70)	
9.6	0	.58	-	-	-	0.02	0.02
11.0	1	.71	-	0.9	0.1	0.4	0.4
12.3	1	.76	-	-	0.3	-	-
13.0	2	.93	2.1	3.2	3.4	7.1	7.6
14.0	2	.93	0.1	0.15	3.3	0.5	0.5
14.5	2	1.0	0.3	0.22	35.5	24.5	26.3
15.0	2	1.0	6.2	10.3	35.5	24.5	26.3
16.1	3	1.2	1.1	1.1	1.2	1.1	1.1
17.6	80%3	1.18	16.5	15.5	8.4	13.0	12.9
18.2	3	1.2	0.8	0.7	0.6	0.7	0.6
19.0	3	1.2	7.4	6.9	3.5	5.5	5.3
20.1	3	1.2	1.3	1.1	0.8	1.1	1.0
20.3	3	1.2	20.1	18.8	9.4	14.2	13.9
21.2	3	1.2	8.0	7.4	3.9	5.8	5.6
22.3	3	1.2	3.9	3.6	1.8	2.8	2.7
23.0	4	1.4	2.4	1.1	0.8	0.9	0.8
23.4	3	1.2	-	-	-	-	-
24.3	4	1.4	3.9	3.7	2.9	2.7	2.6
24.8	4	1.4	2.4	2.3	1.9	1.7	1.7
25.3	3&4	1.3	1.9	1.8	1.5	1.5	1.3
26.8	4	1.4	3.3	3.2	2.2	2.4	2.3
27.6	3	1.2	2.4	2.3	1.4	1.9	1.8
28.5	4	1.4	3.3	3.3	2.3	2.5	2.4
29.7	4	1.4	0.74	0.87	0.4	0.8	0.5
31.0	4	1.4	0.04	0.07	0.03	0.05	0.05
31.7	4	1.4	4.3	4.2	3.6	0.9	0.8
32.3	4	1.4	4.3	4.2	3.6	2.1	2.1
33.0	5	1.6	3.7	3.6	3.4	2.8	2.6
34.0	5	1.6	0.08	0.12	0.08	0.04	0.03
36.0	4	1.4	2.8	2.6	1.7	1.8	1.9
36.6	5	1.6	2.8	2.6	1.1	1.8	1.9
37.6	5	1.6	0.10	0.10	0.4	0.04	0.03
39.0	5	1.6	0.35	0.40	0.76	0.22	0.22
41.0	5	1.6	0.35	0.40	0.76	0.22	0.22
42.2	5	1.6	0.35	0.40	0.76	0.22	0.22
43.3	6	1.8	0.09	0.09	0.27	0.06	0.06
44.5	5	1.6	0.60	0.46	0.97	0.33	0.32
47.6	6	1.8	0.13	0.13	0.28	0.10	0.08
51.0	5	1.6	0.33	0.27	0.80	0.20	0.19
55.0	6	1.8	0.14	0.10	0.22	0.13	0.09
56.0	5	1.6	0.17	0.14	0.42	0.11	0.10
59.0	6	1.8	0.23	0.19	0.40	0.20	0.16

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STLCOPCB4040734

Retention Time (Min.)	No. of Chlorine Atoms	Peak Area Correction Factor	Concentration in Weight %				
			Bayer(12)	Bayer(13)	Bayer(14)	Caffaro(15)	(16)
			Clophen A.30	Clophen A.30(20198)	Clophen A.30(20200)	Apirollo 1431C	Bayer Clophen (14057)(Repeat)
9.6	0	.58	-	-	-	-	-
11.0	1	.71	0.02	0.02	-	-	0.05
12.3	1	.76	-	-	-	-	-
13.0	2	.93	3.5	3.4	3.4	2.7	3.7
14.0	2	.93	0.5	0.5	0.4	0.3	0.5
14.5	2	1.0	1.2	1.3	1.2	0.9	1.3
15.0	2	1.0	8.2	9.2	8.2	7.0	8.7
16.1	3	1.2	1.3	1.4	1.4	1.3	1.4
17.6	80%3	1.18	16.8	16.5	16.7	16.8	17.2
18.2	3	1.2	1.4	1.3	1.3	1.2	1.3
19.0	3	1.2	7.5	7.5	7.6	7.6	7.5
20.1	3	1.2	2.7	2.5	2.5	2.3	2.6
20.3	3	1.2	16.5	16.5	16.6	17.6	16.3
21.2	3	1.2	8.0	7.9	8.1	8.3	7.8
22.3	3	1.2	3.7	3.7	3.8	3.9	3.6
23.0	4	1.4	1.2	1.2	1.2	1.1	1.1
23.4	3	1.2	-	-	-	-	-
24.3	4	1.4	2.9	2.9	2.9	3.3	2.7
24.8	4	1.4	2.2	2.2	2.2	2.4	2.0
25.3	3&4	1.3	1.8	1.7	1.8	1.7	1.6
26.8	4	1.4	2.5	2.9	2.9	3.1	2.5
27.6	3	1.2	2.9	3.0	3.1	3.0	2.8
28.5	4	1.4	2.9	3.0	3.0	3.1	2.5
29.7	4	1.4	0.8	0.9	1.0	0.7	0.8
31.0	4	1.4	0.04	0.08	0.05	0.06	0.04
31.7	4	1.4	0.8	0.8	1.0	3.5	0.8
32.3	4	1.4	2.1	2.5	2.5	3.5	1.9
33.0	5	1.6	2.6	2.9	2.9	3.1	2.4
34.0	5	1.6	0.09	0.08	0.14	0.10	0.11
36.0	4	1.4	1.7	2.3	2.2	2.0	1.4
36.6	5	1.6	0.48	2.3	2.2	0.6	0.75
37.6	5	1.6	0.09	0.08	0.05	0.10	0.13
39.0	5	1.6	0.43	0.31	0.35	0.41	0.47
41.0	5	1.6	0.43	0.31	0.35	0.41	0.47
42.2	5	1.6	0.43	0.31	0.35	0.41	0.47
43.3	6	1.8	0.09	0.08	0.09	0.10	0.13
44.5	5	1.6	0.55	0.49	0.57	0.59	0.73
47.6	6	1.8	0.25	0.12	0.14	0.15	0.30
51.0	5	1.6	0.43	0.30	0.33	0.38	0.71
55.0	6	1.8	0.30	0.09	0.14	0.19	0.48
56.0	5	1.6	0.21	0.15	0.19	0.18	0.40
59.0	6	1.8	1.29	0.16	0.26	0.25	1.26

DSW 159036

STLCOPCB4040735

Monsanto

FROM (NAME & LOCATION) R. E. Keller - Technology Dept. - S. Second St. - St. Louis

DATE November 5, 1970

SUBJECT COMPOSITION OF POLYCHLORINATED
BIPHENYL PRODUCTS

REFERENCE

TO A. F. Regan
Newport

CONFIDENTIAL

cc H. S. Bergen - GO
W. B. Papageorge - GO
W. R. Richard - GO
R. H. Munch - Res. 2
E. M. Emery - Res. 2
E. S. Tucker - Res. 2
M. W. Dietrich - Res. 2
R. A. Baxter/H. S. Vodden/
R. A. Lidgett - Ruabon
D. Danna - GO

During the week of 11-2-70, we analyzed a set of polychlorinated biphenyl products for chlorinated biphenyl isomers using our most up-to-date gas chromatography technique. Current Newport Aroclor 1242 was included in this set. Table I gives the weight percentages found for chlorine homologues ranging from 0 to 6 chlorines per biphenyl unit. Table II represents a more detailed breakdown of the isomers separated by GC.

Results show that Monsanto, MCL and competitive products listed in the tables all contain from 4.4 to 7.8% penta- and <0.05 to 0.9% hexachlorinated biphenyls. Prodelec 1499 and 1500 thought to be low in penta- and hexa-isomers are not available in the U.S. for inclusion in this work. We have reserved the GC column for analysis of these products upon receipt of same from Europe. Results for the above Prodelec materials will be sent to your attention.

Details of GC Work

Our Physical Chemistry Group (E. Emery) analyzed the samples by flame ionization gas chromatography using the mass spectrometry peak identifications provided in Spectroscopy Special Study 69-3. Our SE-52 SCOT capillary columns have gone bad, so these analyses were done on a 200 ft. X 0.02" I.D. SE-52 conventional wall-coated capillary column. This accounts for the somewhat different retention times reported in Table II. Relative response factors have been obtained for the flame ionization detector to enable us to put the results on a weight basis. This was done by running a few known isomers and narrow distillation fractions containing only a single chlorine level. An average peak area correction factor was thus obtained for each chlorine level as tabulated in Table II. Each peak area is multiplied by this factor to give a corrected peak area on a weight basis. The corrected peak areas are normalized to give a concentration for each component in weight per cent.

R. E. Keller

db
Attach. - 2

TABLE I

Weight % of Chlorinated Biphenyls

Number of Chlorine Atoms

	<u>0</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>
1) Aroclor 1242, Made at WGK - 3/9/70	0.01	0.7	15.7	49.0	26.3	7.8	0.53
2) Aroclor 1242 E-18, Made in Great Britain 7/21/70	0.01	0.04	13.2	58.8	23.2	4.6	0.11
3) MCS-1016*	0.02	1.0	19.7	57.3	21.2	0.8	<0.05
4) Kaneclor KC 300	-	-	10.9	60.5	24.1	4.4	0.12
5) Bayer - Clophen	-	0.02	18.2	59.4	16.5	5.0	0.86
6) Prodelec Superad	-	-	12.2	60.5	22.6	4.6	0.16
7) Prodelec 1499	(To be obtained upon receipt of samples from Europe)						
8) Prodelec 1500							

*Aroclor 1242 distilled to remove high boilers

Detailed Sample Identifications
(As written on bottles)

- 1) Aroclor 1242, Bottle 46, ABS #1, 3/9/70 WGK.
- 2) Aroclor 1242 E.18 Sample 8, #N701 9035, 7/21/70, made in Great Britain by Monsanto.
- 3) MCS 1016 1348560 Drum I, 7/27/70 Pilot Plaht.
- 4) Kaneclor KC 300, from Fujiken at June 70, for #III samples of P.G.B. letter of June 11, 1970.
- 5) Bayer - Clophen Trial Product 14057, OW7095012, 11K 8072/2 (contains epoxide additive, probably Der 332).
- 6) Prodelec Superad (6% Unox 206), Ex Dubilier condenser, from Peter Marsh, London.

DSW 159038

STLCOPCB4040737

TABLE II

Retention Time (Min.)	No. of Chlorine Atoms	Peak Area Correction Factor	Concentration in Weight %						Retention Time From Spec. Special Study 69-3
			(1) A-1242 WGK	(2) A-1242 Gr. Britain	(3) MCS 1016	(4) Kaneclor KC 300	(5) Bayer Clophen	(6) Prodelac Superad	
9.6	0	0.58	0.01%	0.01%	0.02%	-	-	-	4.7
11.0	1	0.71	0.5	0.04	0.7	-	-	-	7.6
12.3	1	0.76	0.2	-	0.3	-	-	-	10.7
13.0	2	0.93	3.4	2.6	4.2	1.7%	3.9%	2.2%	11.6
14.0	2	0.93	0.8	0.2	0.9	.13	0.5	0.02	13.6
14.5	2	1.0	1.4	0.8	1.7	.6	1.4	0.24	14.5
15.0	2	1.0	7.4	6.3	9.4	5.2	8.9	6.3	14.8
16.1	3	1.2	0.9	1.2	1.1	1.2	1.4	1.0	16.4
17.6	80%3	1.18	14.0	16.3	17.3	16.3	17.6	17.0	18.2
18.2	3	1.2	1.0	1.3	1.1	1.2	1.5	.9	19.3
19.0	3	1.2	5.8	7.5	6.9	7.6	7.9	7.8	19.8
20.1	3	1.2	2.0	2.2	2.1	2.3	2.7	1.2	21.2
20.3	3	1.2	2.0	2.2	2.1	2.3	2.7	1.2	21.4
21.2	3	1.2	14.0	17.1	17.1	18.1	16.5	20.4	22.2
22.3	3	1.2	6.7	8.2	8.0	8.6	8.0	8.2	23.1
23.0	3	1.2	3.0	3.7	3.5	3.9	3.6	3.8	23.7
23.4	4	1.4	1.2	1.2	1.1	1.3	1.0	1.1	24.0
24.3	4	1.4	4.2	3.6	5.0	3.9	2.7	3.8	25.1
24.8	4	1.4	3.2	2.7	3.6	3.0	2.0	2.4	25.5
25.3	3&4	1.3	2.4	1.9	2.6	2.1	1.4	1.7	25.9
26.8	4	1.4	3.6	3.5	4.4	3.6	2.5	3.5	26.9
27.6	3	1.2	3.2	3.6	2.4	3.5	2.9	2.8	27.2
28.5	4	1.4	3.7	3.5	3.7	3.7	3.7	3.2	27.8
29.7	4	1.4	0.6	0.6	0.6	0.8	0.4	0.6	28.8
31.0	4	1.4	0.05	-	-	.01	-	-	29.6
31.7	4	1.4	1.4	1.2	0.4	1.1	0.7	1.3	29.8
32.3	4	1.4	3.6	3.1	0.8	2.9	1.9	3.0	30.3
33.0	5	1.6	4.3	3.4	0.8	3.4	2.5	3.7	30.6
34.0	5	1.6	0.10	-	0.10	-	-	-	31.3
36.0	4	1.4	2.6	2.2	0.10	2.1	1.5	2.2	32.1
36.6	5	1.6	1.1	.5	0.09	0.5	0.6	0.47	32.6
37.6	5	1.6	0.56	.29	0.01	0.28	0.27	0.12	33.1
39.0	5	1.6	0.07	0.02	-	0.006	-	-	34.3
41.0	5	1.6	0.32	0.10	-	0.11	0.14	0.08	34.6
42.2	5	1.6	0.48	0.17	-	0.16	0.25	0.12	35.0
43.3	6	1.8	0.26	0.07	-	0.06	0.07	0.04	35.4
44.5	5	1.6	0.87	0.48	-	0.37	0.58	0.39	35.9
47.5	6	1.8	0.21	0.09	-	0.06	0.12	0.07	37.1
51.0	5	1.6	0.48	0.21	-	0.15	0.65	0.22	38.1
55.0	5	1.6	0.39	0.16	-	0.10	0.59	0.15	40.5
59.0	6	1.8	0.05	-	-	-	0.68	0.05	42.5

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