ORIGINAL SUBMISSION

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12-04-07 P04:27 RCVD

November 28, 2007

Office of Food Additive Safety (HFS-255)
Center for Food Safety and Applied Nutrition
Food and Drug Administration
5100 Paint Branch Parkway
College Park, MD 20740-3835

RE: Submission of GRAS Notification for Alkyl Polyglycoside Surfactants.

Dear Sir/Madame:

In accordance with proposed 21 CFR § 170.36 (Notice of a claim for exemption based on a GRAS determination) published in the Federal Register (62 FR 18939-18964), I am submitting, as the agent to the notifier, Cognis Corporation, a GRAS Notification for Alkyl Polyglycoside Surfactants for use in the cleaning of food products, the cleaning of equipment used to process food, the manufacture of products that come in contact with food, fruits and vegetables including meat and poultry carcasses, the cleaning of materials that subsequently come in contact with food, paper, cardboard, plastic or stainless steel lines and/or production vessels, and the cleaning and sanitizing of surfaces in food preparation areas. It is anticipated Alkyl Polyglycoside surfactants would be present in most final cleaning product formulations at no more than 20% active and at final use levels less than 2% active.

Four (4) original copies of the notice are enclosed. This includes one for review by the US Department of Agriculture.

Please let me know if you have any questions.

Sincerely,

Edward A. Steele
President

Enclosures (4)

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GRAS EXEMPTION CLAIM

Alkyl Polyglycoside Surfactants

November 28, 2007

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Table of Contents

I. GRAS Exemption Claim 4

A. Claim of Exemption from the Requirement for Premarket Approval Requirements Pursuant to Proposed CFR § 170.36(c)(1) 4

B. Name and Address of Notifier 5

C. Common or Usual Name of the Notified Substance and Identity of GRAS Substance 5

D. Conditions of Use and Consumer Exposure 6
Meat Carcasses 6
Poultry 7
Fruits 8
Levels of Addition 11

E. Basis for the GRAS Determination 11

F. Availability of Information 13

II. Detailed Information about the Identity of the Substance 14

A. Identity 14

B. Method of Manufacture 18

C. Food Grade Specifications for Alkyl Polyglycosides 20

III. Detailed Summary of the Basis for the Notifier's Determination That Alkyl Polyglycosides are GRAS - Safety Assessment of Alkyl Polyglycoside Surfactants 22

A. Toxicokinetics and Metabolism 22
Metabolism study on Alkyl Polyglycosides 22
Metabolism of fatty alcohols 23
Category justification for fatty alcohols and alkyl polyglycosides 25

000006

B. Acute Oral Toxicity 27

C. Mutagenicity 28

D. Chromosomal Aberrations 29

E. Subchronic Toxicity 29

F. Toxicity-Reproductive and Developmental 31
Impairment of Hormonal Functions-E-screen and reporter gene assay *31*
Reproductive Toxicity *32*
Developmental Toxicity *32*

IV. Other Pertinent and Supportive Safety Information 33

A. Acute Dermal Toxicity 33

B. Dermal Irritation 34

C. Mucous Membrane Irritation (Eye Irritation) 36

D. Skin Sensitization 36

E. Existing Regulatory Approvals 37

F. Environmental Exposure Assessment 38

V. Conclusions Supporting the Safety of Alkyl Polyglycosides in Food Products 39

REFERENCES 41

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I. GRAS Exemption Claim

A. Claim of Exemption from the Requirement for Premarket Approval Requirements Pursuant to Proposed CFR § 170.36(c)(1)

Alkyl Polyglycoside surfactants (C6-C16 Degree of Polymerization (DP) 1.1-2.0) have been determined to be generally recognized as safe, and therefore, exempt from the requirement of premarket approval, under the conditions of their intended use as described below. The basis for this finding is described in the following sections.

Signed,

Edward A. Steele Date 11/21/07

Agent for:

Cognis Corporation
5051 Estecreek Drive
Cincinnati, OH 45232

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B. Name and Address of Notifier

Cognis Corporation
Attn: Cindy Becknell
Paralegal/Legal Information Manager
Legal Services NA
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Cincinnati, OH 45232
Phone: 513-482-3014; Fax: 513-482-5574
cindy.becknell@cognis.com

C. Common or Usual Name of the Notified Substance and Identity of GRAS Substance

The subject that has been determined to be Generally Recognized as Safe (GRAS) and thus is the subject of this GRAS notification is a group of products collectively designated Alkyl Polyglycoside surfactants in the range of C6-C16, DP 1.1-2.0.

These specific commercially available Alkyl Polyglycoside surfactants are manufactured from fatty alcohol and glucose/dextrose. Details of their manufacture are provided in the section below titled Method of Manufacture.

All Alkyl Glucosides currently manufactured by Cognis are made from either mixtures of fatty alcohols reacted with dextrose to form the Alkyl Glucoside or are blends of Alkyl Glycosides of various chain lengths and degrees of polymerization. There are only three distinct CAS numbers for the Alkyl Glycosides that are included in this GRAS Notification. An explanation of specific names and nomenclature is presented for these products in Table 1A:

Nomenclature and Chemical Description of GRAS Notified Alkyl Polyglycosides

Trade Name	INCI Name	CAS #	Carbon Chain	Degree of Polymerization	Alkyl Glycoside Blend
Glucopon 215 UP	Capryl Glucoside	68515-73-1	C8-10	1 5	NO
Glucopon 225 DK	Capryl Glucoside	68515-73-1	C8-10	1 7	NO
APG 325	No INCI Name	132778-08-6	C9-11	1 6	NO
Glucopon 600 UP	Lauryl Glucoside	110615-47-9	C12-16	1 4	NO
Glucopon 625 UP	Lauryl Glucoside	110615-47-9	C12-16	1 6	NO
Glucopon 425 UP	Decyl Glucoside	681573-1 & 110615-47-9	C8-16	1 5	YES
Glucopon 650	Coco Glucoside	681573-1 & 110615-47-9	C8-16	1 5	YES

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The INCI names used in the table are not the chemical descriptors as found on the Material Safety Data Sheet (MSDS). The INCI name and chemical descriptors are presented below.

INCI Name	Chemical Descriptor
Capryl Glucoside	D-Glucose, decyl, octyl ethers, oligomeric
Lauryl Glucoside	D Glucopyranoside, C10-16 alkyl, oligomeric
Decyl Glucoside	D-Glucose, decyl, octyl ethers, oligomeric D- Glucopyranoside, C10-16 alkyl, oligomeric
Coco Glucoside	D-Glucose, decyl, octyl ethers, oligomeric D- Glucopyranoside, C10-16 alkyl, oligomeric
APG® 325 has none	D-Glucopyranoside, C9-11, oligomeric

D. Conditions of Use and Consumer Exposure

Cognis intends to market Alkyl Polyglycoside (Glucopon®/APG® surfactants (C8-10, C9-11 and C10-16) for use in the cleaning of fruits and vegetables as well as meat and poultry carcasses, the cleaning of equipment used to process food, the manufacture of products that come in contact with food, the cleaning of materials that subsequently come in contact with food, paper, cardboard, plastic or stainless steel lines and/or production vessels, and the cleaning of surfaces in food preparation areas. Alkyl Polyglycoside surfactants would be present in most final cleaning product formulations at no more than 20% active (commercial product) and at final use levels less than 2% active following dilution for specific uses. As a point of reference, this is the concentration at which Alkyl Polyglycoside is used in toothpaste in Germany and Japan. Relative to meat carcasses, we anticipate virtually no residue as usage is always followed by a potable water rinse. This is explained in detail below.

Meat Carcasses

The cleaning and dehairing of meat carcasses or the defeathering of poultry usually involves the use of caustic solutions. Alkyl Polyglycosides are stable in caustic media and will aid the effectiveness of the caustic by increasing the wetting ability of the caustic solution. When the skin of the carcass is exposed to such a solution, it may contain 10% caustic and 5% active Alkyl Polyglycoside surfactant (=50 g/l). If each carcass is washed using 240 liters of solution and five liters remains on the carcass as a worst case scenario, the residue of the Alkyl Glycoside

would be 250 g/ carcass. The caustic wash is then followed by a potable water rinse that removes 95% of the residual Alkyl Glycoside. Therefore, the amount remaining on a carcass would be reduced to 12.5 g. Since the skin is removed prior to human consumption, the amount that would be potentially ingested would be limited to that which may contact the meat during the skinning process. In 2006, the average slaughter weight of beef cattle was estimated to be 778 pounds (Cattle Network Today 12/14/06). If one assumes that 100% of the residual solution (12.5 g) is evenly distributed over the meat (778 pounds), this would result in a level of 16.07 mg per pound, or 35 ppm. In terms of exposure, if a 60 kg person consumed two (2) pounds of meat per day, again expressed as a worst case scenario, this would result in an exposure of 32.14 mg per day. The Margin of Safety (MOS) is calculated as follows: (MOS) = No Observed-Adverse--Effect-Level i.e., NOAEL (1000mg/kg) x 60 kg (average individual) divided by Exposure. (Note: The NOAEL was determined from the safety assessment studies on Alkyl Polyglycosides found in Section IV). The MOS for exposure that occurs from consuming two pounds of meat is approximately 1,870.

In another possible application, the Alkyl Polyglycoside can be used to wash the meat during butchering. In this process, the slaughter weight of the cattle is then reduced by about 390 pounds (removal of bone, blood, and other parts not used for human consumption), with total weight reduced by about 50% to 389 pounds. Further, if the meat is then washed with a 2% active solution of Alkyl Polyglycoside (20 g/l) and if 5 liters remains on the meat and is evenly distributed over the meat, then this would result in a level of 257 mg per pound of meat consumed. When this is followed by a potable water rinse, this level is further reduced by approximately 95% to a level of 12.9 mg per pound of meat. In terms of exposure, if one assumes that a 60 kilogram person consumes 2 pounds of meat containing 25.8 milligrams of Alkyl Polyglycoside, the daily exposure to this chemical from a carcass wash is estimated at 0.43mg/Kg. The MOS is calculated at 2326.

Poultry

Similar estimates can also be applied if the meat source is poultry. Here, the weight of each animal is much lower and the size much smaller. It is estimated that the overall exposure will be similar. For example, if a chicken or other poultry animal weighing 4 pounds is treated with 8 liters of a caustic solution containing 5% active Alkyl Polyglycoside, after removal of the feathers an estimated 30 ml may remain on the carcass. This 30 mls will contain 1.5g of active Alkyl Polyglycoside. A potable water wash will remove about 95% of the residual solution leaving 75 mg of Alkyl Polyglycoside on the animal. If the animal weight without feathers is 3 pounds the amount of Alkyl Polyglycoside is 25 mg/pound of chicken. In terms of exposure, if one assumes that a 60 kilogram person were to consume 2 pounds of the chicken, the exposure is

0.8 mg/Kg. from residual Alkyl Polyglycoside used in the defeathering process. The MOS is calculated as 1,250.

Further, if a 2% active solution is later used in the cleaning of the chicken, resulting in a residual thin film of solution (~30 ml), the amount of Alkyl Polyglycoside is 600mg on the chicken or other poultry. This would always be followed by a potable water rinse to remove about 95% of the solution. The exposure is then reduced to 30 mg. In terms of exposure, for a 60 Kg person this would result in a daily exposure of 0.5 mg per Kg per day. The MOS is calculated to be at worst case 2,000.

Fruits

To specifically address worst case exposure scenarios from vegetables and fruits, Cognis conducted experiments on representative samples to determine the residual (C9-11, C8-10 and C10-16) known by the commercial names of APG ®325N, Glucopon ®215UP and Glucopon® 600UP that would remain on an apple, an orange, a tomato, a potato, and a head of broccoli when a 0.5% active solution is used to "clean" the surface and allowed to dry without a potable water rinse. Representative fruits and vegetables were immersed in a beaker containing the active Alkyl Polyglycoside surfactant solution and then removed. It was assumed that as part of this exposure that all surfactant solution would remain on the test food. All measurements were conducted at 23°C and 43% relative humidity. The results for residual Alkyl Polyglycosides from these ranges (C8-10, C9-11 and C10-16) on fruits and vegetables are presented below.

0.5% active Glucopon® 215 UP-(C8-10 Alkyl Polyglycoside)

fruit / vegetable type	Sample #	wt initial g	wt. after dip (g)	mg active on produce	mg / kg produce	Average mg APG / kg produce
orange	1	121 221	121 601	1.900	15 674	**15.225**
	2	126 219	126 592	1.865	14 776	
campari tomato	1	36 674	36 831	0 785	21 405	**21.405**
	2	35 974	36 128	0 770	21 404	
potato	1	93.978	94.484	2 530	26 921	**23.238**
	2	100 482	100.875	1 965	19 556	
apple	1	187 892	188.439	2 737	14.567	**13.124**
	2	165 907	166 294	1 938	11.681	
broccoli	1	17 177	20 219	15 210	885.486	**995.121**
	2	12 238	14 942	13 520	1104.756	

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0.5% active Glucopon® 600 UP-(C10-16 Alkyl Polyglycoside)

fruit / vegetable type	Sample #	wt initial g	wt. after dip (g)	mg active on produce	mg / kg produce	Average mg APG / kg produce
orange	1	135 513	135 901	1 940	14 316	**14.377**
	2	136 793	137 188	1 975	14 438	
campari tomato	1	41.622	41.771	0 745	17 899	**17.952**
	2	37 766	37 902	0 680	18 006	
potato	1	86 357	86 859	2 510	29 065	**25.053**
	2	87 686	88 055	1 845	21.041	
apple	1	172.994	173 438	2 220	12 833	**15.417**
	2	160 243	160 820	2 884	18 001	
broccoli	1	16 994	19 791	13 985	822 938	**855.066**
	2	16 400	19.310	14 550	887 195	

0.5% active APG® 325 N-(C9-11 Alkyl Polyglycoside)

fruit / vegetable type	Sample #	wt initial g	wt. after dip (g)	mg active on produce	mg / kg produce	Average mg APG / kg produce
orange	1	136 867	137 261	1 970	14 394	**14.858**
	2	117 467	117 827	1 800	15 323	
campari tomato	1	34 428	34 569	0.705	20 478	**20.589**
	2	36 473	36 624	0 755	20.700	
potato	1	82 691	83 041	1 750	21 163	**21.567**
	2	93 984	94 397	2.065	21 972	
apple	1	175 079	175 719	3 204	18 300	**16.468**
	2	187 892	188 442	2 750	14.636	
broccoli	1	12 406	14 962	12 780	1030.147	**946.016**
	2	13 192	15 466	11 370	861 886	

As expected, broccoli had the most surfactant residue due to its high surface area, with nearly 1,000 mg residual surfactant per kilogram of broccoli. The remaining fruits and vegetables all had less than 25 mg residual surfactant per kg fruit or vegetable.

The quantities of different fruits and vegetables commonly consumed in the CSF II 1994-1996 database are reported in literature (Smiciklas-Wright *et al* , 2005). Together with the amount of Alkyl Polyglycoside on different fruits (mg Alkyl Polyglycoside/kg produce), an average exposure of Alkyl Polyglycosides has been calculated (see following table). In risk characterization, the margin of safety (MOS) is calculated from a comparison of the relationship between the critical no-observed-adverse-effect level (NOAEL, in this case 1000 mg/kg body weight, see sections I and J) observed in the most sensitive species from appropriate repeated-dose animal studies and systemic human exposure (typical human body weight 60 kg) in use.

Fruit/veg	Fruit/veg consumption kg/day	average exposure of Alkyl Polyglycoside mg/day			Margin of safety (MOS) (MOS=NOAEL*60 kg/exposure)		
		C8-10	C10-16	C9-11	C8-10	C10-16	C9-11
orange	0 171	2 60	2.46	2 54	23077	24390	23622
tomato	0 067	1.43	1 20	1 38	41958	50000	43478
potato	0 103	2.39	2 58	2.22	25104	23256	27027
apple	0.148	1 94	2 28	2 44	30928	26316	24590
broccoli	0.081	80 6	69 26	76.62	744	866	783

Based on the risk characterization and the high MOS, there will be no adverse effects to humans after repeated oral intake of Alkyl Polyglycosides from the intended uses.

NOTE: Because of the high MOS, we see no need to require a potable water rinse after the washing of fruits and vegetables in the Alkyl Polyglycoside solution although some manufacturers may choose to do so.

If a solution containing Alkyl Glycoside is to be used in the lye peeling of sugar beets, it will always be followed by a potable water rinse. This is to remove the residual lye and is not necessary for the removal of the Alkyl Glycoside. If this rinse was eliminated, then the exposure to residual Alkyl Polyglycoside would be similar to that reported for the potato listed above (2.58 mg). The use of a potable water rinse will further reduce this level by about 95% to a worst case of 0.130 mg per day exposure with a MOS of 461539.

Levels of Addition

It is anticipated Alkyl Polyglycoside surfactants would be present in most final cleaning product formulations at no more than 20% active and at final use levels less than 2% active. As a point of reference, this is the concentration at which Alkyl Polyglycoside is used in toothpaste in Germany and Japan. As noted above, consumption of a fruit or vegetable by a person weighing 60 kg would result in exposure to 0.08 mg/kg. Relative to meat or poultry carcasses, we anticipate virtually no residue as usage is always followed by a potable water rinse.

E. Basis for the GRAS Determination

The GRAS determination for the Alkyl Polyglycosides in this Notification under the proposed maximum use levels described in Section C, Conditions of Use and Consumer Exposure, is based on scientific procedures as described under Title 21 of the Code of Federal Regulations (21CFR)§170 30(b). These scientific procedures have been used to demonstrate that the estimated intake from exposure to the Alkyl Polyglycoside surfactants that are the subject of this Notice including Glucopon®215,225DK; APG®325N, Glucopon® 600UP, 625UP, and Glucopon® 425N and Glucopon® 650 EC from the intended uses specified above, is safe, and also GRAS under the Food, Drug, and Cosmetic Act (FDCA). Glucopon®225 and APG®325 use in meat-room degreasing (USDA/FSIS (Food Safety and Inspection Service) are included in the list of proprietary substances and non-food components). As noted in 40 CFR Part 180 [OPP-2003-0362; FRL-7729-7], this regulation establishes two exemptions from the requirement of a tolerance for residues of alkyl (C10-C16) polyglycosides also known as D-glucopyranose, oligomeric, C10-C16-alkyl glycosides when used as an inert ingredient in or on growing crops, when applied to raw agricultural commodities after harvest, or to animals. Cognis Corporation submitted a petition to EPA under the Federal Food, Drug, and Cosmetic Act (FFDCA), as amended by the Food Quality Protection Act of 1996 (FQPA), requesting an exemption from the requirement of a tolerance. This regulation eliminates the need to establish a maximum permissible level for residues of D-glucopyranose, oligomeric, C10-C16-alkyl glycosides. In addition, Cognis has determined that the potential maximum exposure from a combined intake per person (standard body weight used is 60 kg) per day of residues of the aforementioned Alkyl Polyglycosides on fruits and vegetables would be approximately 90 mg. The margin of safety for this intake is far in excess from any anticipated exposure as noted by the Margin of Safety (MOS) risk calculations referenced above. Therefore, the use of Alkyl Polyglycosides in the above mentioned exposure scenarios is considered to be safe. Further, we believe that the safety of this level of potential intake would be agreed to by generally recognized experts qualified by both training and experience to evaluate the safety of substances directly or indirectly added to food, and is also based on generally available and accepted information.

Cognis has determined the Generally Recognized As Safe (GRAS) status of Alkyl Polyglycoside surfactants for use in the cleaning of fruits and vegetables or animal carcasses, the cleaning of equipment used to process food, the manufacture of products that come in contact with food, the cleaning of materials that subsequently come in contact with food, paper, cardboard, plastic or stainless steel lines and/or production vessels, and the cleaning of surfaces in food preparation areas. It is anticipated Alkyl Polyglycoside surfactants would be present in most final cleaning product formulations at no more than 20% active and at final use levels less than 2% active, and the final uses would result in minor additional exposure and would not add significantly to the overall Estimated Daily Intake (EDI). Cognis has also conducted a comprehensive search of the literature to determine if there were any additional publications relative to these compounds for any additional safety and toxicological information beyond those referenced in this document and found none.

Based on the safety assessments of Alkyl Polyglycosides of varying chain lengths provided above, Cognis has concluded that the toxicological endpoints evaluated provide a sound scientific basis for concluding that these compounds have a very low order of toxicity, can be skin and eye irritants in concentrated forms (which is not applicable for the intended uses), are not mutagenic, estrogenic, embryotoxic or teratogenic and any observed effects in long-term exposure assessments were due to irritation at high doses that are not physiologically relevant, and are reversible. Further, Alkyl Polyglycosides are transformed into physiologically occurring metabolites that chemically behave in an identical fashion to their native counterparts (i.e., they are cleaved into glucose and fatty alcohol and participate in fatty acid metabolism) thus further supporting the safety observed in the subchronic study and demonstrating the very low order of toxicity of these surfactants.

Cognis also notes that several authors cited in the above-referenced publication (Willing, Messinger and Aulmann (2004)) estimated exposure to surfactants via relevant sources such as drinking water, food and dental hygiene products. On the basis of drinking water (1-2 mg/day), dental hygiene products (0.1-0.9 mg/day) and residues of dishwashing detergents (0.3-0.4 mg/day), they have provided figures for daily intakes ranging from 0.3 to 3 mg/person/day. Considering a standardized body weight of 60 kg, these figures result in a "worst case" exposure daily dose of 0.05 mg/kg b.w., which is far below the NOAEL for Alkyl Polyglycosides (1000 mg/kg b.w.) in both the subchronic toxicity study as well as in the other oral safety assessment studies referenced above. This conclusion is also supported by the exposure and risk assessment calculations done for exposures to different fruits and vegetables which are mentioned above in Section D. From this data, Cognis concludes that the exposure from Alkyl Polyglycosides will be harmless and that they are safe for the applications requested.

Following a critical evaluation, Cognis concludes:

"Based on a critical evaluation of the publicly available data and information summarized above, the group of products collectively designated Alkyl Polyglycoside surfactants meeting the specifications cited above, and when used as an active ingredient in the applications identified above and when used at a maximum level of 20% active and at final use levels less than 2% active, and resulting in a mean potential intake of no more than 600 mg per day (calculated from the NOAEL of 1000 mg/kg, using a standard human body weight of 60 kg, and applying a Margin of Safety [MOS] of 100) of all Alkyl Polyglycosides, is safe, and GRAS, for addition to food.

It is also Cognis' opinion that other qualified and competent scientists reviewing the same publicly available toxicological and safety information would reach the same conclusion.

Because the group of products collectively designated Alkyl Polyglycosides is GRAS based on scientific procedures for its proposed uses, it is excluded from the definition of a food additive, and thus may be marketed and sold for the designated uses identified above in the U.S. without the promulgation of a food additive regulation under 21 CFR."

F. Availability of Information

The detailed data and information that serve as a basis for this GRAS determination will be provided to the FDA upon request, or are available for the Food and Drug Administration's review and copying during reasonable business hours at the offices of:

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President
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II. Detailed Information about the Identity of the Substance

A. Identity

As manufactured, Alkyl Polyglycoside surfactants are a mixture of monomer (fatty alcohol with one glucose unit) and oligomers (fatty alcohols plus various numbers of glucose units) with a distribution that follows the mathematical model developed by P.J. Flory. (Refer to Figure 1 below).

Alkyl Polyglycosides consist of a hydrophobic alkyl residue derived from a fatty alcohol and a hydrophilic saccharide structure derived from dextrose, which are linked through a glycoside bond. Surfactant alkyl glucosides have alkyl residues with about 6-18 carbon atoms. The prominent characteristic is the hydrophilic headgroup, constituted by saccharide structure with one or several glycosidally interlinked D-glucose units. A simplified and generalized empirical formula for these molecules can be written as

$$H\text{-}(C_6H_{10}O_5)_n\text{-}O\text{-}\ C_XH_{2X+1}$$

n equals the average number of glucose units present in the saccharide moiety
x equals the number of carbon atoms of the alkyl chain (fatty alcohol).

The empirical formula does not reveal the complex stereochemistry and polyfunctionality of Alkyl Polyglycosides. The long chain alkyl residues may possess linear or branched carbon skeletons, although the linear moieties are usually predominant. Chemically speaking all d-glucose units are polyhydroxyacetals, which usually differ in their ring structures as well as in the anomeric configuration of the acetal structure. Moreover, there are various options for the type of glycoside bonds between the d-glucose units of alkyl oligosaccharides. These possible variations lead to manifold, complex, chemical structures, making designation of these substances difficult (Surfactant Science Series volume 91 pages 8-9).

All D-glucose units show an acetal function whose carbon atom is the only one linked to two oxygen atoms. This is called an anomeric carbon or anomeric center. The glycosidic bond with the alkyl residue, as well as the bond with the oxygen atom of the saccharide ring, originate from the anomeric carbon atom. For orientation in the carbon chain, the carbon atoms of the d-glucose units are numbered continuously (C1 to C6) starting with the anomeric carbon atom. The oxygen atoms are numbered according to their position at the chain (O-1 to O-6). The anomeric carbon atom is asymmetrically substituted and can therefore assume two different configurations. The resulting steroisomers are called anomers and are distinguished by the prefix

α or β. According to the nomenclature conventions, α-anomers show that one of the two possible configurations whose glycosidic bond points to the right in the Fisher projection formulas of d-glucosides. Precisely the opposite is true of the β-anomers. This provides the structural elements for the α-D and the β-D glucosides (Surfactant Science Series vol 91 page 9). With one D-glucose unit, four different isomeric alkyl monoglucosides may be found; e.g., 1. alkyl α-D-glucopyranoside 2. alkyl β-D-glucopyranoside, 3. alkyl α-D-glucofuranoside, and 4. alkyl β-D-glucofuranoside (Surfactant Science Series vol 91 page 11).

Alkyl Diglycosides have a disaccharide unit linked to the alkyl residue. Like the Monoglycosides they also comprise an interglycosidic bond as a new structural element. One oxygen atom of the hydroxyl groups of the first saccharide unit is linked with the anomeric center of the second saccharide moiety. The possible choices between different types, ring forms, and anomeric configurations of the second saccharide as well as several available bonding sites at the first saccharide ring open up a multitude of structural variants. An Alkyl Diglycoside has a possible 64 possible isomers.

Commercially available Alkyl Glycosides may contain thousands of isomeric structures of the head group. They may contain from 1 to 14 glucose units per fatty alcohol. Flory in 1951 developed a model for describing the oligomer distribution of products based on polyfunctional monomers (J. Am Chem Soc. 74, 1952 2718 attached as Appendix 1). This distribution model has been used to describe Alkyl Polyglycosides as a mixture of statistically distributed oligomers. The content of individual species in the oligomer mixture decreases with increasing degree of polymerization. The oligomer distribution obtained by this mathematical model correlates well with analytical results. In simple terms the reported degree of polymerization (DP) of alkyl Polyglycoside mixtures can be calculated from the mole percent p_i of the respective oligomeric species "i" in the glycoside mixture.
Mathematically this can be expressed

$$\sum_{i=1}^{\infty} p_i/100 \times i$$

In commercial products this is graphically represented as

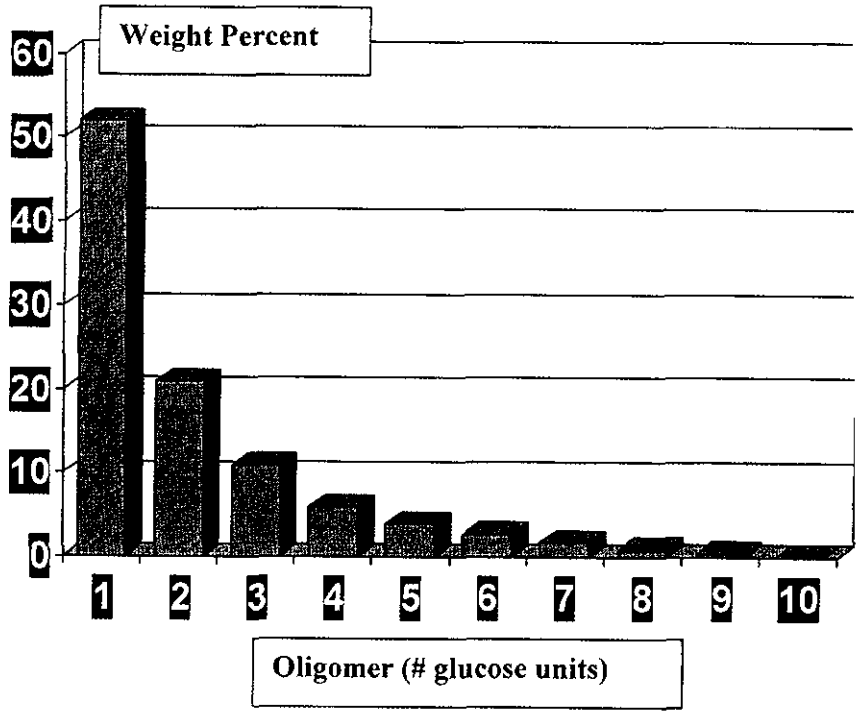


FIGURE 1

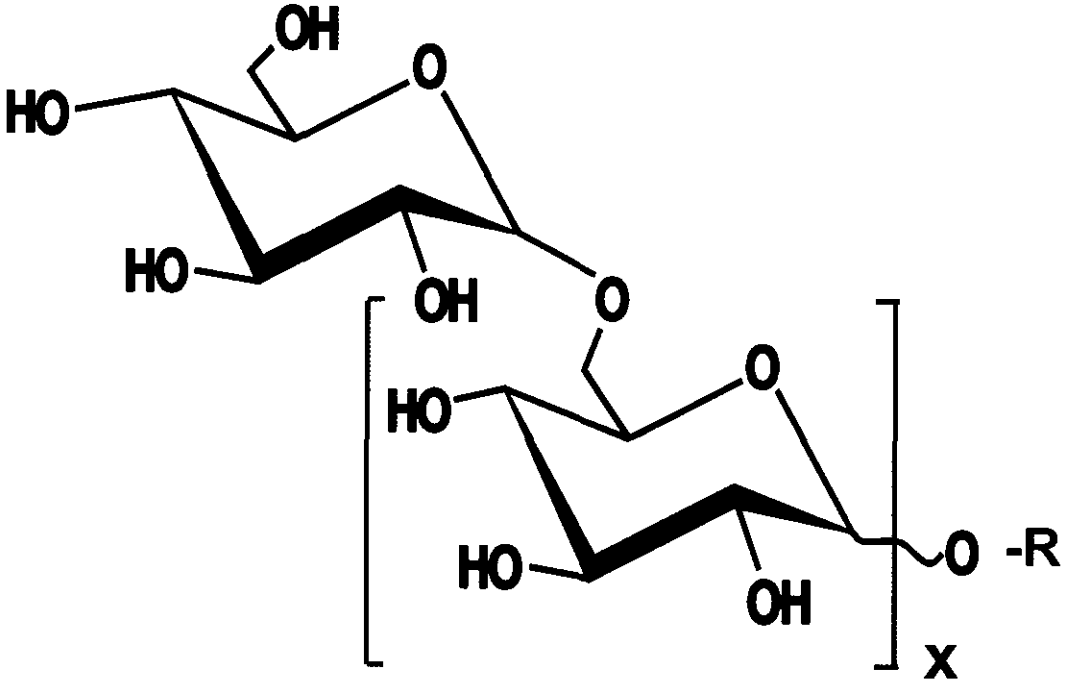
Attached as Appendix 1 is the statistical determination of the degree of polymerization and the weight percent of the various X-MER or number of glucose units attached to different fatty alcohols of given molecular weights.

The weight percent content of individual species in this mixture decreases with increasing degree of polymerization. The majority of the species contain one or two sugars per fatty alcohol. The number of sugar molecules per fatty alcohol is expressed as DP or degree of polymerization. This number ranges from 1.3 to 1.8. This measurement has been made using HPLC techniques on multiple batches over a period of more than 15 years. The fatty alcohols used for these products have carbon chains of C8, C9, C10, C11, C12, C14, and C16 or mixtures thereof. These fatty alcohols are derived from edible food crops (i.e., corn, rapeseed, palm kernel and coconut oils. The source for synthetic fatty alcohols used to manufacture APG 325 is from petroleum. Neither the DP nor the carbon chain distribution is a part of the specifications but is only referred to as part of the product description. Currently, Cognis produces three types of Alkyl

Polyglycosides that serve as the basis of their product line and that are the subject of this notification. These three types have the following chemical descriptor names and CAS numbers.

Type	Chemical Descriptor	Trade Name	CAS#
C8-10 APG®	D-Glucose, decyl, octyl ethers, oligomeric	Glucopon®215, 225	68515-73-1
C9-11 APG®	D-Glucopyranoside, C9-11 alkyl, oligomeric	APG® 325	132778-08-6
C10-16 APG®	D-Glucopyranoside, C10-16 alkyl, oligomeric	Glucopon® 600,625	110615-47-9

The structure of the molecule is depicted in Figure 1-1. R is the alkyl chain used for the manufacture of a specific product. X is the number of glucose units.



[Dextrose]
X=0-8
DP avg; 1.3-1.7

R is primarily based on coconut or palm kernel oil carbon chain range from C8-16

Figure 1-1:Chemical Structure of Alkyl Polyglycosides

Calculated Distribution of Glucose Units per Fatty Alcohol

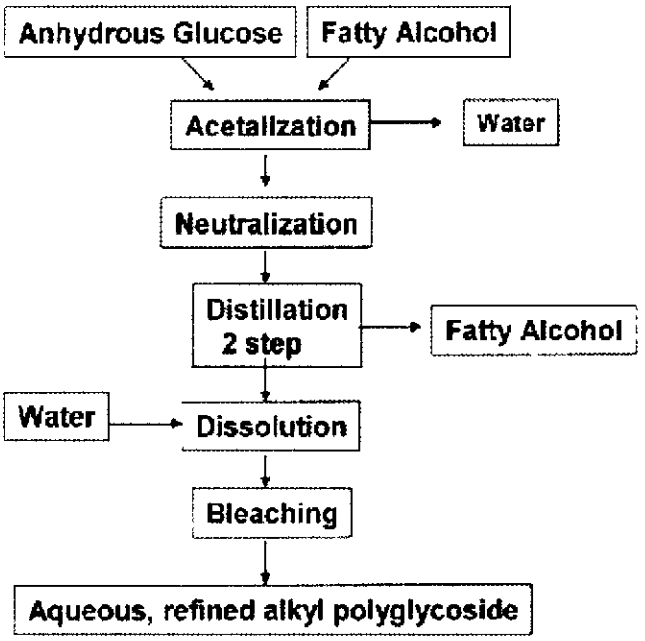
	Molecular Weight of Fatty Alcohol		
# glucose units	**143***	**158****	**193***
1	61.20	61.67	62.71
2	21.74	21.75	21.21
3	9.13	9.00	8.70
4	4.13	4.05	3.87
5	1.94	1.90	1.81
6	0.94	0.91	0.86
7	0.46	0.45	0.42
8	0.23	0.22	0.21
9	0.11	0.11	0.10
10	0.06	0.06	0.05
11	0.03	0.03	0.03
12	0.01	0.01	0.01
13	0.01	0.01	0.01
14	0.00	0.00	0.00

This data expressed as percent glucose units per fatty alcohol clearly show that the only difference in the Alkyl Glycosides is the length of the alkyl chain. These molecules are very closely related and thus can be treated similarly.
*Fatty alcohols from natural sources; i.e., primarily edible food crops identified above
**Synthetic source of fatty alcohol for APG 325 (petroleum derived)

B. Method of Manufacture

To synthesize Alkyl Polyglycoside surfactants, dextrose is reacted directly with the fatty alcohol to form the required long-chain Alkyl Polyglycoside. The glucose used is dried prior to the actual reaction to minimize side reactions that will take place in the presence of water. The reaction uses an acid catalyst such as linear alkyl benzene sulfonic acid. The catalyst is neutralized with sodium hydroxide. The neutralized reaction mixture contains 50-80% fatty alcohol. The excess fatty alcohol is removed by vacuum distillation using a thin film evaporator leaving fatty alcohol

levels of <1 % in the finished product. The alkyl glucoside is then directly dissolved in water producing a viscous 50-70% Alkyl Polyglycoside finished product. The product may then be refined in a bleaching step. The residual peroxide from the bleaching process is less than 25 ppm in the finished product. The residual catalyst in the neat product is less than 0.5% on a 100% active basis. At use levels of 10% active in a finished product this translates to 0.05%. The level in the neat product is less than 200 ppm and at a level of 10% in a finished formulation this would be 20 ppm. At a more common use level of 4% this would be 8 ppm. A simplified flow diagram of the manufacturing process for the production of Alkyl Polyglycosides is shown below.



The production process for Alkyl Polyglycosides is well characterized and can consistently yield a food-grade product that is safe for human consumption at the exposure levels anticipated with the ongoing analytical testing and quality control procedures in place and described below for potential contaminants.

Acceptable analytical methodology is also employed for Alkyl Polyglycosides that include measurement of heavy metals including lead, cadmium, mercury, and arsenic. Cognis'

toxicologists have critically evaluated the production process for Alkyl Polyglycosides summarized above and have concluded that this process is well characterized and can consistently yield a food-grade product that is safe for human consumption.

C. Food Grade Specifications for Alkyl Polyglycosides

Cognis has been producing Alkyl Polyglycoside surfactants in their commercial facility since 1992. Cognis' Alkyl Polyglycoside surfactants, under the product trade names Glucopon®/APG®, have similar specifications. Analytical testing has shown that all products shipped during this period meet the specifications. Table 1 shows the specifications for APG®/Glucopon® surfactants as provided by Cognis Corporation.

Table 1 Specifications for APG®/Glucopon® Surfactants

	Glucopon® 215 UP	Glucopon® 225 DK	APG® 325N	Glucopon® 425N	Glucopon® 600 UP	Glucopon® 625 UP
Actives %	62 - 65	68 0 - 72 0	48 0 - 52 0	48 0 - 52.0	48 0 - 52 0	48.0 - 52 0
Ash %			3 0 Max	3.0 Max	3 0 Max	3.0 Max
Color, Gardner			7 0 max	4 0 max	3 0 max	4.0 max
Free Fatty Alcohol			0.5 max			
pH, 10% Solution*	11 5 -12 5	6 0 - 9 0	7 0 - 9 5	7 0-9 5	11 5 - 12 5	11 5 - 12.5
Preservatives			Pass**	Pass**		
Water	35 - 38	28 0 - 32 0				

Blank spaces = no specifications
* 10% solids solution using an 85/15 DI water / IPA mixture Also, the pH is intentionally high because there is no preservative added
** Pass refers to presence of gluteraldehyde as the preservative as others contain none These two products can be made with or without gluteraldehyde.

Cognis also monitors the Alkyl Polyglycoside products to ensure levels of by-products and impurities meet internal standards for current cosmetic and meat room degreasing applications. Below is an example of the type of by-products / impurity analyses that Cognis reports for Alkyl Polyglycoside products.

By-products and Impurities
(not regularly determined)

By-Product/Impurity	Concentration	Method of Analysis	Detection Limit
Arsenic	below detection limit	Ph.EUR 3 2 4 2	1 ppm
Heavy metals (total as Pb)	below detection limit	Ph.EUR.3 2 4 8	10 ppm
Organic compounds			
Fatty alcohol	max 1 %	HPLC	
Glucose	max 0.5 %	COGNIS method	
Iron	<1= 5 ppm	AAS	1 ppm
Magnesium	< 600 ppm		
Polyglucose	3 - 5 %	COGNIS method	
Sulphated ash	<3 %	Ph EUR 32 4 14	0 1 %
Water	component of the content	DGF C-11I13a / H-III 3a	<1% / >1%

Cognis' toxicologists conclude that the analyses of the Alkyl Polyglycosides which are the subject of this Notification support the presumption that there is no toxicological concern from any product impurities.

III. Detailed Summary of the Basis for the Notifier's Determination That Alkyl Polyglycosides are GRAS - Safety Assessment of Alkyl Polyglycoside Surfactants

Alkyl Polyglycosides of different chain lengths have been investigated in depth for any potential health risks. A tiered toxicological test program for Alkyl Polyglycosides was undertaken in compliance with acknowledged guidelines, especially OECD Guidelines for the Testing of Chemicals and utilizing the principles of good laboratory practices. All studies reported in several widely disseminated books and book chapters and publications (Willing, Messinger and Aulmann (2004), Aulmann and Sterzel (1997), Steber *et al*, (1995)) comply with currently acceptable and recognized testing regimens for the safety assessment, toxicological evaluation, classification and labeling of chemical substances and were performed in accordance with recognized protocols. Consequently, the quality of data allows for scientifically sound risk assessments for a variety of application scenarios, for both occupational and personal care use. A compilation of all toxicological testing results was reported by Willing, Messinger and Aulmann (2004) in *Handbook of Detergents, Part B Environmental Impact, 2004*, and is presented in each of the respective safety testing sections that follow.

A. Toxicokinetics and Metabolism

Alkyl Polyglycosides, produced by Cognis, are surfactants containing a long-chain fatty alcohol glycosidically bound to a sugar. Studies described in literature (see detailed description below) clearly indicated that alkyl glycosides with different fatty alcohols (c-chains C8, C12 and C16) are readily degraded after oral intake due to the fast hydrolysis of the ß-glycosidic bond. Based on the similarity in hydrolysis, alkyl glycosides containing different c-chain length of fatty alcohols behave identically after oral intake and transformed into physiologically occurring metabolites (sugar and fatty alcohol) which are toxicologically of no concern.

Metabolism study on Alkyl Polyglycosides

Weber and Benning (1984) evaluated the metabolism of three alkyl glycosides:-octyl glucoside (carbon chain of alcohol is C8; part of Glucopon 215 UP, 225 DK, 425 UP, 650, APG 325)
-dodecyl maltoside (carbon chain of alcohol is C12; the glucoside is part of Glucopon 600 UP, 425 UP, 650)
-hexadecyl glucoside (carbon chain of alcohol is 16; part of Glucopon 600 UP, 425 UP, 650)

The radiolabeled substances were administered by gavage to female NMRI mice. Two hours after treatment the animals were sacrificed and relevant organs were analyzed to determine distribution in specific organs.

Stomach, intestines, liver and kidney showed the highest concentrations of radioactivity for the compounds. Using extraction methods, it was shown that Alkyl Polyglycosides are readily cleaved into glucose and fatty alcohol, which is further oxidized to the corresponding fatty acid and partly incorporated in normal fat metabolism. Octyl glucoside was rapidly transformed into hydrophilic metabolites during intestinal and liver passage, whereas hexadecyl glucoside showed a much greater tendency towards lipophilic metabolism, resulting, e.g., in preferential identification in the liver of radiolabeled palmitoyl glycerides. These findings are underlined by the fact that ß-oxidation occurs more easily in medium-chain fatty acids than in long-chain fatty acids (Scheig (1968) and Petit *et al.*, (1982)).

Figure 2 summarizes the metabolic pathway of Alkyl Polygycosides. First, the ß-glycosidic bond between glucose and long-chain alcohol is hydrolyzed. Glucose and glucose oligomers enter the carbohydrate metabolic pathway and are catabolized. Long-chain alcohols are acylated to wax esters, then either incorporated into ether glycerolipids or oxidized to fatty acids. Finally, the fatty acids are either esterified to ester glycolipids or oxidized to acetate.

These test substances (C8-, C12- and C16-Alkyl Glycosides) represent the whole range of possible chain length of non-branched fatty alcohols (C8-16) for commercial Alkyl Polyglycosides which are characterized in Table 1A. Alkyl Polyglycosides with branched fatty alcohols (C9, C11) will also rapidly degrade after oral intake due to the hydrolysis of the ß-glycosidic bond. The branched fatty alcohol will not influence the hydrolysis. Thus, all Alkyl Polyglycosides are transformed into glucose and fatty alcohol (branched or non-branched). The metabolism of fatty alcohols is discussed in more detail in the following paragraph while the metabolism of glucose is not further discussed. Glucose is regarded as safe after oral intake.

Metabolism of fatty alcohols

Fatty alcohols represent the main difference in the structure of the different Alkyl Polyglycosides. Therefore, different fatty alcohols occur after hydrolysis of Alkyl Polyglycosides. The metabolism of these fatty alcohols is described in more detail to show that the resulting fatty alcohols (C8 linear, C9 branched, C10 linear, C11 branched, C12 linear, C14 linear and C16 linear) belong to a category with comparable toxicological properties.

The initial step in the mammalian metabolism of primary alcohols is the oxidation to the corresponding carboxylic acid, with the corresponding aldehyde being a transient intermediate.

These carboxylic acids are susceptible to further degradation via acyl-CoA intermediates by the mitochondrial β-oxidation process. This mechanism removes C2 units in a stepwise process and linear acids are more efficient in this process than the corresponding branched acids. In the case of unsaturated carboxylic acids, cleavage of C2-units continues until a double bond is reached. Since double bonds in unsaturated fatty acids are in the cis-configuration, whereas the unsaturated acyl-CoA intermediates in the β-oxidation cycle are trans, an auxiliary enzyme, enoyl-CoA isomerase catalyses the shift from cis to trans. Thereafter, β-oxidation continues as with saturated carboxylic acids [WHO, 1999].

An alternative metabolic pathway for aliphatic acids exists through microsomal degradation via ω-or ω–1 oxidation followed by β-oxidation. This mechanism provides an efficient stepwise chain-shortening pathway for branched aliphatic acids (Verhoeven, *et al.*, 1998). The acids formed from the longer chained aliphatic alcohols can also enter the lipid biosynthesis and may be incorporated in phospholipids and neutral lipids (Bandi *et al*, 1971a&b and Mukherjee *et al,* 1980). A small fraction of the aliphatic alcohols may be eliminated unchanged or as the glucuronide conjugate (Kamil *et al*, 1953).

Similar to the dermal absorption potential, orally administered aliphatic alcohols also show a chain-length dependant potential for gastro-intestinal absorption, with shorter chain aliphatic alcohols having a higher absorption potential than longer chain alcohols.

With regards to the blood-brain barrier, a chain-length dependant absorption potential exists with the lower aliphatic alcohols and acids more readily being taken up than aliphatic alcohols/acids of longer chain-length (Gelman, 1975).

The long chain aliphatic carboxylic acids are efficiently eliminated so that aliphatic alcohols will not have a tissue retention or bioaccumulation potential (Bevan, 2001). Longer chained aliphatic alcohols within this category may enter common lipid biosynthesis pathways and will be indistinguishable from the lipids derived from other sources (including dietary glycerides) (Kabir, 1993; 1995a,b).

In summary, long chained alcohols are efficiently metabolised and there is limited potential for retention or bioaccumulation for the parent alcohols and their biotransformation products.

Category justification for fatty alcohols and alkyl polyglycosides

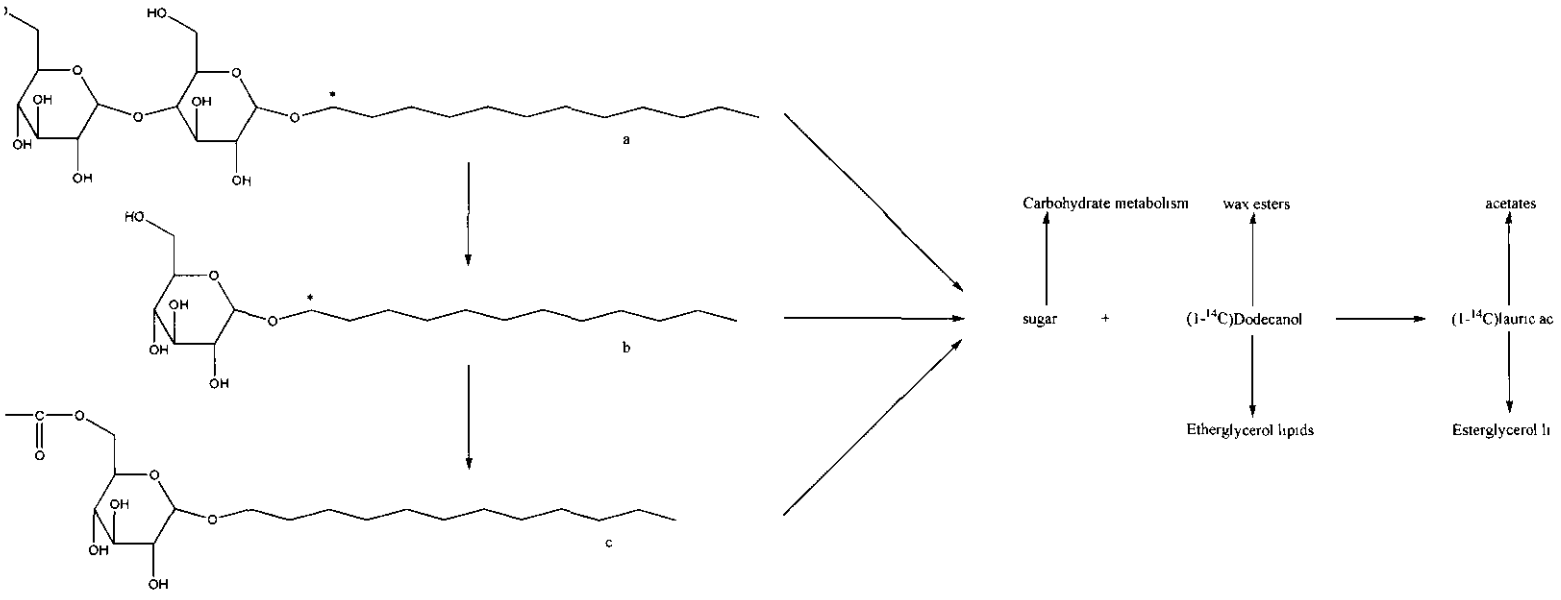
A review of the toxicological database for the category of the linear alcohols (OECD 2006) demonstrates that members of the long chain alcohols are of a low order of toxicity upon single or repeated exposure: "Overall, the data show an inverse relationship between chain length and toxicity. The shorter chain alcohols tend to induce more pronounced effects when compared to materials with a longer chain length (probably because there are more moles in a given mass of a lower molecular weight formula). This is illustrated most clearly by the degree of local irritation in studies involving single or repeat administration. Linear alcohols have no skin sensitization potential, are not mutagenic and have not shown any adverse effects on fertility, development and reproduction. There is a clear relationship between chain length and the toxicological properties justifying comparison (read-across) of potential toxicological properties between members of this category." (OECD 2006)

For the branched alcohols the toxicological database demonstrates that this class is also of a low order of toxicity following acute and repeated exposures. The overall profile of the toxicity is qualitatively and quantitatively comparable to that of the class of the linear alcohols for all of the end points assessed in this comparison. The relationship between chain length and toxicological properties is also present for the class of the branched alcohols and is equivalent to that of the linear alcohols (OECD 2006).

The key human health hazards for the category of fatty alcohols are skin and eye irritation. For the aliphatic alcohols in the range C6 – C11 a potential for mild skin and eye irritation exists without tissue destruction or irreversible changes. Aliphatic alcohols in the range C12 – C16 have a low degree of skin irritation potential; alcohols with chain lengths of C18 and above are non-irritant to skin. The eye irritation potential for alcohols with a chain length of C12 and above has been show to be minimal (OECD 2006).

Acute toxicity and irritation have been investigated using substances with a linearity of 5 to 100% (content of non-branched fatty alcohols). Skin sensitisation studies are available for materials with 50-100% linearity showing no sensitising potential. For the assessment of the repeated dose toxicity, reproduction and development test materials with a degree linearity of minimally 50 % were used in key studies. A lack of mutagenic potential was determined for this category, including highly branched substances. Surrogate substances for the sub-category of the essentially linear alcohols include 100% branched aliphatic alcohols thereby extending the toxicological profile of this category and justifying the [comparison] (read-across) within the category of the long-chain aliphatic alcohols (OECD 2006).

Based on the fact that different Alkyl Polyglycosides discussed in this document show a similar metabolic pathway resulting in the occurrence of sugar and different fatty alcohols (in this case C8 to C16 alcohol), and that fatty alcohols can be seen as a category with comparable toxicological properties with regard to systemic toxicity, it is expected that Alkyl Polyglycosides as a group would show similar toxicological properties on repeated-dose toxicity. As a consequence, results from repeated application studies (see sections E and F) obtained with C12/16 Alkyl Polyglycosides (Glucopon 600 UP) are representative for the whole group of Alkyl Polyglycosides (C8-16 Alkyl Polyglycosides).



2 metabolism of [1-^{14}C] Dodecyl-beta-D-maltosid in the mouse
1-^{14}C [illegible]cyl-beta-D-maltosid
1-^{14}C[illegible]ecyl-beta-D-glucosid
1-^{14}C] Dodecyl-(6 -O-acyl)-beta-D-glucosid
radioactive carbon

B. Acute Oral Toxicity

Assuming low toxicity, primary limit tests were performed with Alkyl Polyglycosides, using doses of 2000 or 5000 mg/kg b.w. in three groups of animals. These doses were chosen to comply with the regulatory requirements in Europe and the United States used to define individual classification limits for chemical substances. In Europe, a chemical substance with an LD_{50} over 2000 mg/kg b.w. is not subject to classification, whereas in the USA the level is set at 5000 mg/kg b.w.

The acute toxicity test results for the different Alkyl Polyglycoside types are shown in table 8 from the 2004 report (page 506) referenced above. The tested compounds represent the whole range of Alkyl Polyglycosides discussed in this document.

Table 8. Acute Oral Toxicity of Alkyl Polyglycosides			
	C8/10	**C12/14**	**C10/16**
Degree of Polymerization	1.6	1.5	1 6
Percent Active Substance	50	60	50
Limit Dose (mg/kg b.w.)	>5000	>2000	>5000
Test Animals	Sprague-Dawley rat 5 male/5 female	Wistar rat 2 male/2 female	Sprague-Dawley rat 5 male/5 female
Mortalities	0/10	0/4	0/10
Animals with Gross Necropsy Findings	0/10	0/4	0/10
Ref	102	103	104

Chemical structure appeared to have little influence on the acute oral toxicity of Alkyl Polyglycosides (>2000 mg/kg b.w.). The products tested covered a broad range of linear C8-C16, with degrees of polymerization between 1.5 and 1.6. For the dose range used, none of the animals showed any adverse effects in response to Alkyl Polyglycoside challenge, irrespective of fine chemical structure. Thus ingestion of Alkyl Polyglycosides does not represent an acute health risk.

C. Mutagenicity

Alkyl Polyglycoside (Glucopon® 600UP, C12-16 Alkyl Polyglycoside) was tested on Salmonella typhimurium TA 98, TA 100, TA 1535, TA 1537 and TA 1538 in two independent experiments, both with and without S9 mix metabolic activation according to the OECD guideline 471. Test concentrations were: 8, 40, 200, 1000, and 5000 µg/plate (1st test). Due to cytotoxic effects starting at 900 µg/plate, test concentrations were adjusted to 11.1, 33.3, 100, 300 and 900µg/plate (2nd test) according to the test guideline. Solutions of the Alkyl Polyglycosides were prepared in deionized double distilled water prior to use.

Compared with concurrent negative controls, no precipitations or enhanced revertant rates were observed in all strains tested in the presence or absence of metabolic activation. 4-Nitro-o-phenylenediame, 9-aminoacridine, and sodium azide controls were positive without S9 activation, and the aminoanthracene control was positive with S9 activation. C12-16 Alkyl Polyglycoside did not induce reverse mutations and were not mutagenic in this test system (Willing, Messinger and Aulmann (2004), page 512).

Based on the fact that different Alkyl Polyglycosides show a similar metabolic pathway resulting in the occurrence of sugar and different fatty alcohols (in this case C8 to C16 alcohol), and that

fatty alcohols can be seen as a category with comparable toxicological properties with regard to mutagenicity, Alkyl Polyglycosides is regarded as a group with similar toxicological properties. As a consequence, results from the mutagenicity studies obtained with C12-16 Alkyl Polyglycosides (Glucopon 600 UP) are representative for the whole group of Alkyl Polyglycosides (C8-16 Alkyl Polyglycosides).

D. Chromosomal Aberrations

Cultured Chinese hamster V79 lung fibroblasts were exposed repeatedly to C12-16 Alkyl Polyglycosides (Glucopon 600 UP) every 4 hours per OECD Guideline No. 473 (EU Guideline B10). No biological effects, with respect to aberration induction, were observed at any time, either with or without S9 activation. Thus it was concluded that C12-16 Alkyl Polyglycosides were not clastogenic under the conditions of the test design (Willing, Messinger and Aulmann (2004), page 513).

Based on the fact that different Alkyl Polyglycosides show the same metabolic pathway resulting in the occurrence of sugar and different fatty alcohols (in this case C8 to C16 alcohol), these fatty alcohols can be seen as a category with comparable toxicological properties with regard to chromosome aberration. Therefore, Alkyl Polyglycosides can be considered as a group with regard to toxicological properties. As a consequence, results from the chromosome aberration study obtained with C12-16 Alkyl Polyglycosides (Glucopon 600 UP) are representative for the whole group of Alkyl Polyglycosides (C8-16 Alkyl Polyglycosides).

E. Subchronic Toxicity

C12/16 Alkyl Polyglycosides were investigated in compliance with OECD Guideline 408 for subchronic toxicity (Willing, Messinger and Aulmann (2004)). Ten male and 10 female Sprague-Dawley rats per dosage group were administered daily with 250, 500 and 1000 mg/kg b.w./day by gavage for 90 days. An untreated group served as the control. No significant changes were seen due to treatment in body weight gain, food consumption, relative organ weights, biochemical, ophthalmological or hematological parameters due to treatment. Gross pathology at necropsy revealed ulcerations and edema restricted to the forestomach in the high-dose group. Pathological and histological examinations revealed that no statistically significant or biologically relevant substance-related changes had occurred in any of the organs except the forestomach. Histopathology revealed dose-dependent manifestation of ulcers and inflammatory edema accompanied by acanthosis and proliferation of the mucosa confined to the mucous membrane of the forestomach of both male and female high-dose group and to a lesser extent in the mid-dose group. No substance-specific histopathology was evident in the forestomachs of the

low-dose group. Examination of the forestomachs of a recovery group from the high-dose showed that these effects were reversible albeit slowly.

Since eye contact with Alkyl Polyglycosides produces irritation, irritative effects on the mucous membranes of the gastrointestinal tract were not unexpected and this was confirmed in the 90-day study. After discontinuation of sample application (recovery group), examination of the forestomachs gave evidence that the effects were reversible.

The inherent irritation potential requires special thought in the risk assessment process. Based on the dosing regime used in the 90-day oral toxicity study, specific problems can arise if the dosing regime is bolus-like, as was the case in this study. Other authors have previously reported that results from gavage studies differ from those of a more continuous intake (diet, drinking water) (Hayes, (1994), Greaves, (1990), and ECETOC (2003)). They demonstrated that gavage administration of irritating substances produced local ulcerations in the rodent forestomach due to peak concentrations of a test substance. If the same dose was applied in feeding or drinking-water studies, or incorporated into the diet via microencapsulation as has been reported for Citral (Dieter, 1993) and cinnamaldehyde (Hebert, 1994), no lesions were observed in the forestomach. In all these cases, dilution of the substance provides a good explanation for the different responses. Although feeding studies would mimic dietary exposure more realistically, bolus-like applications are a state-of-the-art technique to ensure accurate dosing. In other words, the bolus-like application reflects a more severe than worst-case food exposure condition. Furthermore, the pH of the raw Alkyl Polyglycoside material is adjusted to a pH 12 to avoid microbial contamination which further enhances the irritation potential.

Thus, since only local reversible effects on the forestomach based on irritation were observed, the No-Observed-Adverse-Effect Level (NOAEL) for systemic oral toxicity was therefore calculated to be1000 mg/kg bw/day.

A dermal study for subacute toxicity with C8-10 Alkyl Polyglycoside (60% active substance) was conducted in New Zealand white rabbits with doses between 60 mg and 3000 mg /kg b.w./day applied to the intact skin for 14 days. Doses at 1500 mg/kg b.w./day and above induced severe skin irritation after repeated application as well as several changes in hematological and clinical parameters and testicular atrophy. Minimal to mild skin irritation was seen in dose groups starting from 540 mg/kg b.w./day, whereas no clinical, hematological or organ changes were reported at this dose. At and below 180 mg/kg b.w./day, none of the described adverse events were observed. A NOAEL for systemic effects was set at 540 mg/kg b.w./day.

Based on the fact that different Alkyl Polyglycosides discussed in this document show the same general metabolic pathway resulting in the occurrence of sugar and different fatty alcohols (in this case C8 to C16 alcohol), and that fatty alcohols can be seen as a category with comparable toxicological properties with regard to systemic toxicity, also Alkyl Polyglycosides is regarded as a group with similar toxicological properties on repeated dose toxicity. As a consequence, results from repeated application studies obtained with C12-16 Alkyl Polyglycosides (Glucopon 600 UP) are representative for the whole group of Alkyl Polyglycosides (C8-16 Alkyl Polyglycosides).

F. Toxicity-Reproductive and Developmental

Impairment of Hormonal Functions-E-screen and reporter gene assay

The MCF-7 proliferation assay (E-Screen Assay) and the MCF-7 reporter gene assay were used as predictors of potential estrogenic activity (Willing, Messinger and Aulmann (2004)).

In the E-screen, the induction of cell proliferation (mitogenic effect) in MCF-7 cells, an estrogen-dependent human breast tumour cell line, is determined. A wide range of concentrations of the test substance is compared to a negative control (medium) and to reference substances (17-ß-estradiol and bisphenol A). C12/16 Alkyl Polyglycoside (Glucopon 600 UP) concentration ranges of 0.1-10,000 nmol were tested in this assay. No effects were noted with Alkyl Polyglycoside concentrations up to 10^5 times higher than the 0.1nmol positive control.

The effects of C12/16 Alkyl Polyglycosides (Glucopon 600 UP) are also investigated in a reporter gene assay. In this assay, the induction of luciferase activity in stably transfected MCF-7 cells (plasmid pVIT-tk-Luc), which express the luciferase gene under the control of wild type vitellogenine A2 promoter (derived from *Xenopus laevis*), is assayed. The luciferase activity correlates directly with the estrogenic potency of the tested ligand (test substance). In contrast to the E-Screen assay in which only cell proliferation is analysed, in this assay an estrogen-specific response on the gene expression level is measured. Transgene reporter gene systems are considered superior to the human MCF-7 cell line systems due to their better specifity and higher throughput. In the gene reporter assay, no concentration-dependent induction of luciferase was noted with the C12/16 Alkyl Polyglycosides (Glucopon 600 UP) at concentrations up to 100,000 times higher than the positive control.

Based on these results, there is no indication that C12/16 Alkyl Polyglycosides (Glucopon 600 UP) might act as an endocrine modulator.

Reproductive Toxicity

Using OECD Guideline No. 421, an assessment of the reproductive toxicity of C12/16 Alkyl Polyglycosides (Glucopon 600 UP) was conducted in 10 male and 10 female rats/group following daily administration by oral gavage of 100-, 300- and 1000-mg/kg b.w. /day doses (Willing, Messinger and Aulmann (2004)). No effects indicative of general toxicity were observed in parental animals. Relative and absolute weights of testes, epididymides and seminal vesicles did not differ between test and control animals. With regard to reproductive parameters, no test substance–related symptoms were observed. Mean litter weights, pup weights, sex ratios, and gestation periods did not differ significantly among all groups. No clinical pre-weaning effects were noted and necropsy or histological examination did not reveal any effects in parental or F_1 pups. On the basis of these results, a NOAEL of 1000 mg/kg b.w. /day was determined.

Developmental Toxicity

C12/16 Alkyl Polyglycosides (Glucopon® 600 UP) were tested in a segment II study per OECD Guideline No. 414 at dose levels of 0, 100, 300 and 1000 mg/kg b.w./day in pregnant CD-Rats. The substance was administered daily by gavage from days 6 to 15 of gestation. A standard dose volume of 10 mL/kg b.w. was used. Clinical condition and reaction to treatment were recorded at least once daily. Maternal weights were reported on days 0, 6, 16 and 20 of gestation.

All dams tolerated the applied dose levels of up to 1000 mg/kg b.w. /day without lethality. Maternal body weight gain was not affected by treatment. For maternal toxicity a NOAEL of 1000 mg/kg b.w. was deduced.

All females had viable fetuses, and pre- and post-implantation losses as well as mean numbers of resorption were not affected by treatment at any dose. Skeletal and visceral examinations also did not detect any treatment-related malformations. For embryo/fetotoxicity and teratogenicity, the NOAEL was also determined to be 1000 mg/kg b.w. with no effect observed at any dose level tested.

Comment: Both the developmental toxicity and teratogenicity NOAEL far exceed any reasonable foreseeable exposure to Alkyl Polyglycosides in humans. Furthermore, the data for these surfactants provide assurance of a lack of effect on maternal toxicity or reproductive capacity.

Based on the fact that different Alkyl Polyglycosides discussed in this document show a similar metabolic pathway resulting in the occurrence of sugar and different fatty alcohols (in this case C8 to C16 alcohol), and that fatty alcohols can be seen as a category with comparable

toxicological properties with regard to systemic toxicity, also Alkyl Polyglycosides is regarded as a group with similar toxicological properties on repeated dose toxicity. As a consequence, results from repeated application studies obtained with C12-16 Alkyl Polyglycosides (Glucopon 600 UP) are representative for the whole group of Alkyl Polyglycosides (C8-16 Alkyl Polyglycosides).

IV. Other Pertinent and Supportive Safety Information

A. Acute Dermal Toxicity

Five male and female New Zealand white rabbits received single limit doses of either 2000 mg/kg b.w. of C8/10 or C10-16 Alkyl Polyglycosides applied dermally. Data on the acute dermal toxicity of Alkyl Polyglycosides are summarized in Table 9 from the above referenced publication.

For C8/10 Alkyl Polyglycoside, clinical signs recorded in individual animals during the observation period of 14 days included mild to moderate irritating effects due to the high concentration. One animal receiving the test substance died. This was not test-substance related but rather was due to Tyzzer's disease, an infectious disease condition that was confirmed by microscopic examination. At the end of the 14-day observation period, all surviving animals were killed. Gross necropsy revealed spotty areas of hemorrhage on the lungs of five rabbits. The same protocol was applied using C10-16 Alkyl Polyglycoside. No deaths occurred and no pathological findings were reported.

The effects on the lung with C8/10 Alkyl Polyglycoside were not seen with the closely related C10/16 Alkyl Polyglycoside in the acute dermal toxicity study (see above), neither with C8/10 Alkyl Polyglycoside in a subacute dermal study, nor with C12/16 Alkyl Polyglycoside in a subchronic oral study (see section IV Part E).

As a consequence, the effects observed in the lung in the acute dermal study are assessed as being a single observation, possibly due to an unintended exposure via inhalation, or due to the high pH of the product without relevance to the human exposure scenario.

TABLE 9 Acute Dermal Toxicity of APG

	C8/10	C10/16
Degree of polymerization	1.6	1.6
Active substance	50%	50%
Limit dose (mg/kg b.w.)	>2000	>2000
Test animals	New Zealand white rabbit, 5 male/5 female	New Zealand white rabbit, 5 male/5 female
Mortalities	1/10 (died due to Tyzzer's disease)	0/10
Animals with gross necropsy findings	5/10	0/10
Ref	78	79

B. Dermal Irritation

Table 10 from the above referenced publication (Willing, Messinger and Aulmann (2004)) summarizes the results of skin irritation tests undertaken according to OECD Guideline 404, using linear Alkyl Polyglycosides as the test substance. Short-chain (C8/10) Alkyl Polyglycosides are significantly less of an irritant than their corresponding long –chain (C10/16 or C12/16) homologues.

According to EU legislation, C8/10 Alkyl Polyglycosides need not be labeled below the usual maximum concentration in technical products (70% active substance), whereas C10/16 and C12/16 Alkyl Polyglycosides require labeling as a skin irritant (with EU risk phrase R38 "irritating to the skin") if their concentration exceeds 30%. Furthermore, the primary dermal irritation index (PDII) and mean values for the 24-, 48-, 72-hour erythema data reveal an almost linear increase with increasing concentration, a relationship independent of the degree of polymerization. Even mixtures of short-chain and long-chain Alkyl Polyglycosides fit this scenario well, allowing meaningful extrapolations for labeling issues. A product tested at both pH 7 and pH 11 revealed that irritating properties were almost unaffected by alkalinity. Systemic toxicity after a single dermal application in rabbits was not observed in any of the tests with linear Alkyl Polyglycosides. Furthermore, it has been shown in dermatological studies that Alkyl Polyglycosides used as secondary surfactants significantly enhance the skin compatibility of primary surfactants.

TABLE 10 Data from In Vivo Skin Irritation Studies with Linear APG

Chain length	Degree of polymerization	Active substance	PDII	Positive responder irritation score 2: Erythema (absolute)	Erythema (%)	Edema (absolute)	Mean values 24 48 72: Erythema	Edema	Remarks	Cognis reference
C8 10	1 6	70%	0 8	1 3	33	0 3	0 9	0 0	No labeling no signs of systemic toxicity	R 9300407
C8 10	1 6	35%	1 3	1 3	33	2 3	1 1	0 3	No labeling no signs of systemic toxicity	R 93 00408
C8 10	Not specified	15%	0.0	0 5	0	0 5	0 0	0 0	No labeling	TBD 870150
C10 16	1.4	60%	4.6	4 4	100	4.4	2 9	2 1	R38, occlusive application	TBD 880089
C12/16	1 4	50%	3 7	3/3	100	3/3	2 2	1 6	R 38, no signs of systemic toxicity	R 9400459
C 12 16	1 4	50%	3 0	3 3	100	1/3	2 1	0 9	R 38, no signs of systemic toxicity	R 9300116
C12 16	1 6	50%	3 0	3/3	100	1 3	1 9	1 1	R 38 no signs of systemic toxicity	R 9300178
C12 16	1 4	30%	2 8	5/6	83	3/6	1 7	0 9	No labeling, no signs of systemic toxicity	R 9400460
C10/16	1 4	20%	0 4	1/4	25	2/4	1 2	1 3	No labeling, no signs of systemic toxicity, occlusive application	TBD 880405
C8 10 + C12 16	Not specified	35% C12/16 21% C8,10	2 7	3 3	100	2,3	1 8	0 8	R38	R 9300115

Semiocclusive patches, unless otherwise specified

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C. Mucous Membrane Irritation (Eye Irritation)

Because Alkyl Polyglycosides display significant skin-irritating properties, an *in vitro* pretest was done to avoid unnecessary animal testing using the HET-CAM hen's egg test-chorioallantoic membrane. C10/16 Alkyl Polyglycosides showed slight reactions at pH 7 and pH 11.5. In alkaline solutions, the irritation index reached 55% of the benchmark chemical, whereas the neutralized product caused scores as low as 19% of the benchmark. At the same time, C8/10 Alkyl Polyglycosides were significantly more irritating than 0.5% SDS (sodium dodecyl sulfate) and were evaluated as being highly irritating to the eye.

An *in vivo* study was carried out according to OECD Guideline 405 using an aliquot of 0.1 mL aqueous solution of C12/16 Alkyl Polyglycoside (50% active substance). Eyes were scored at 24, 48 and 72 hours after application. The conjunctivae displayed moderate to strong reactions that did not abate completely after 21 days in two animals. Due to nonreversible corneal effects, C10/16 Alkyl Polyglycosides require labeling as presenting the risk of serious damage to eyes.

Another series of validated eye irritation tests using C12/16 Alkyl Polyglycoside (a dose of 0.1 mL of lauryl glucoside [neutralized,12.5% active substance]) found no irritant reactions and only slight corneal reactions which persisted for less than 48 hours in one animal. Applying the evaluation scheme according to European Directive 67/548 EEC, C12/16 Alkyl Polyglycoside (neutralized) need not be labeled as an eye irritant at concentrations of 12.5% or less.

D. Skin Sensitization

Both animal (guinea pig) and human skin sensitization tests were conducted. These are described in detail in the publication referenced above (Willing, Messinger and Aulmann (2004)).

As shown in Table 11, none of the tests with C12/16 Alkyl Polyglycosides displayed significant potential for skin sensitization either with the Buehler test or the Magnusson-Kligman protocol.

TABLE 11 OECD 406 Sensitization Tests with C12/16 APG

Protocol	Concentration for induction	Concentration for challenge	Number of positive responders	Classified as sensitizer to skin?	Ref
Buehler	Epidermal 20%	Epidermal 20%	1*/20	No	84
Magnusson-Kligman	Intracutaneous 1% Epidermal 60%	Epidermal 10%	0/20	No	85

*Very weak skin reaction

Because animal tests revealed no sensitizing properties, a wide range of Alkyl Polyglycosides were tested in humans in a repeated insult patch test (HRIPT) using the Shelanski protocol. Two-tenths mL of the test substance (active ingredient: 5%) was applied to the upper back of 48 volunteers and kept there for 24 hours. This procedure was repeated 10 times for 3 weeks. Following a 2-week rest interval, the panel was challenged again with the same test solution and evaluated for skin reactions 24 and 48 hours after application. Although the test products covered a broad range from C8 to C16 Alkyl Polyglycosides in different ratios and derived from different raw materials (fatty alcohol from natural and synthetic sources), none of the products induced any skin reaction indicative of sensitization in any volunteer supporting the animal study results.

E. Existing Regulatory Approvals

EPA Status: The Alkyl Polyglycosides APG® 325 and GLUCOPON® 225,220 & 215 are approved for use as inert ingredients under FIFRA applications listed in 40 CFR §180.910. Approval for GLUCOPON® 6XX products (C10-16) has recently been granted. As noted in 40 CFR Part 180 [OPP-2003-0362; FRL-7729-7], this regulation establishes two exemptions from the requirement of a tolerance for residues of alkyl (C10-C16) polyglycosides also known as D-glucopyranose, oligomeric, C10-C16-alkyl glycosides when used as an inert ingredient in or on growing crops, when applied to raw agricultural commodities after harvest, or to animals. Cognis Corporation submitted a petition to EPA under the Federal Food, Drug, and Cosmetic Act (FFDCA), as amended by the Food Quality Protection Act of 1996 (FQPA), requesting an exemption from the requirement of a tolerance. This regulation eliminates the need to establish a maximum permissible level for residues of D-glucopyranose, oligomeric, C10-C16-alkyl glycosides.

FDA Status: The Alkyl Polyglycosides Glucopon®225 and APG®325 are currently approved in meat-room degreasing. All of the C8-10 (i.e., 225, 220, 215) and C9-11(i.e., 325) Alkyl Polyglycosides are approved under FDA 21 CFR §182.99 as adjuvants for pesticides. This FDA section cross references the EPA approval (40 CFR §180.1001) which covers the use of these Alkyl Polyglycosides as inert ingredients for use in pesticide formulations. Under 21 CFR, part 176, the Alkyl Polyglycosides Glucopon® 225 DK and Glucopon 215® UP are approved for indirect food contact for felt cleaning applications.

Drug Master File for Glucopon® 600 UP 17015

Drug Master File for Glucopon®625 UP 12500

F. Environmental Exposure Assessment

Steber *et al.*, (1995) reviewed the Alkyl Polyglycosides from the perspective of all of the ecological and aquatic evaluations conducted and demonstrated that they are readily and completely biodegradable in all environmental conditions and have favorable ecotoxicological properties.

Finally, from an additional exposure perspective, Alkyl Polyglycosides have been used for many years globally in various dishwashing detergents. Oral exposure to Alkyl Polyglycosides can originate from residues on eating utensils and dishes as well as from exposure to residues found in water and food.

The daily exposure to Alkyl Polyglycosides from eating with utensils and dishware that have been washed with Alkyl Polyglycoside-containing dishwashing liquids can be estimated according to the following algorithm presented below from the HERA (2005) guidance document. HERA is a two-phase project and is managed by a team of task forces and other groups from both industry and academia specializing in the provision of expertise and resources in risk assessment and communication. They have developed a website and database containing data on the intrinsic properties of a number of household chemicals including exposure and use.

$$\mathbf{Exp_{sys} = [F_1 \times C' \times T_{a'} \times S_a / BW] \times A}$$

For this exposure estimate, the terms are defined with following values for the calculation considering a worst case scenario:

F_1	percentage weight fraction of substance in product	***20%*** (worst case)
C'	concentration of product in dish wash solution:	***1 mg/cm³*** (AISE, 2002)
$T_{a'}$ (Schmitz, 1973)	amount of water left on dishes after rinsing	***5.5 x 10⁻⁵ ml/cm²***
S_a	area of dishes in daily contact with food	***5,400 cm²*** (TGD, 2003)
BW	body weight	***60 kg*** (TGD, 2003)
A	oral absorption	***100%*** (worst case)

$$\mathbf{Exp_{sys\ (oral\ dish\ deposition)}} = [[0.20 \times (1\ mg/cm^3) \times (5.5 \times 10^{-5}\ ml/cm^2) \times (5{,}400\ cm^2)] / 60\ kg]$$
$$= \mathbf{0.99\ \mu g/kg\ bw/day}$$

Considering the profile of environmental fate of Alkyl Polyglycosides, it is expected that indirect exposures via the environment, including drinking water, are insignificant.

V. Conclusions Supporting the Safety of Alkyl Polyglycosides in Food Products

Cognis has determined the Generally Recognized As Safe (GRAS) status of a group of products collectively designated Alkyl Polyglycoside surfactants with the trade names Glucopon®215, 225DK; APG®325N, Glucopon® 600UP, 625UP, and Glucopon® 425N and Glucopon® 650 EC (which are blends of Glucopon ®215 and Glucopon ®600) for use in the cleaning of fruits and vegetables or animal or poultry carcasses, the cleaning of equipment used to process food, the manufacture of products that come in contact with food, the cleaning of materials that subsequently come in contact with food, paper, cardboard, plastic or stainless steel lines and/or production vessels, and the cleaning and sanitizing of surfaces in food preparation areas. It is anticipated Alkyl Polyglycoside surfactants would be present in most final cleaning product formulations at no more than 20% active and at final use levels less than 2% active. Cognis' toxicologists also conducted a comprehensive search of the literature to determine if there were any additional publications relative to these compounds for any additional safety and toxicological information beyond those referenced in this document and found none.

Based on the safety assessments of Alkyl Polyglycosides of varying chain lengths provided above, Cognis concludes that the toxicological endpoints evaluated provide a sound scientific basis for concluding that these compounds have a very low order of toxicity, can be skin and eye irritants in concentrated forms (which is not applicable for the intended uses), are not mutagenic, estrogenic, embryotoxic or teratogenic and any effects observed in long-term exposure assessments were due to irritation at high doses that are not physiologically relevant, and are reversible. Further, Alkyl Polyglycosides are transformed into physiologically occurring metabolites that chemically behave in an identical fashion to their native counterparts (i.e., they are cleaved into glucose and fatty alcohol and participate in fatty acid metabolism) thus further supporting the safety observed in the subchronic study and demonstrating the very low order of toxicity of these surfactants.

Cognis' toxicologists also note that several authors cited in the above-referenced publication estimated exposure to surfactants via relevant sources such as drinking water, food and dental hygiene products. On the basis of drinking water (1-2 mg/day), dental hygiene products (0.1-0.9 mg/day) and residues of dishwashing detergents (0.3-0.4 mg/day), they have provided figures for daily intakes ranging from 0.3 to 3 mg/person/day. Considering a standardized body weight of 60 kg, these figures result in a "worst case" exposure daily dose of 0.05 mg/kg b.w., which is far below the NOAEL for Alkyl Polyglycosides (1000 mg/kg b.w.) in both the subchronic toxicity study as well as in the other oral safety assessment studies referenced above. This conclusion is also supported by the exposure and risk assessment calculations done for exposures to different

fruits and vegetables which are mentioned above in Section I. D. From this data, Cognis concludes that the exposure from Alkyl Polyglycosides will be harmless and that they are safe for the applications requested.

Following a critical evaluation, Cognis concludes:

"Based on a critical evaluation of the publicly available data and information summarized above, the group of products collectively designated Alkyl Polyglycoside surfactants meeting the specifications cited above, and when used as an active ingredient in the applications identified above and when used at a maximum level of 20% active and at final use levels less than 2% active, and resulting in a mean potential intake of no more than 600 mg per day (calculated from the NOAEL of 1000 mg/kg, using a standard human body weight of 60 kg, and applying a Margin of Safety [MOS] of 100) of all Alkyl Polyglycosides, is safe, and GRAS, for addition to food.

It is also Cognis' opinion that other qualified and competent scientists reviewing the same publicly available toxicological and safety information would reach the same conclusion.

Because the group of products collectively designated Alkyl Polyglycosides is GRAS based on scientific procedures for its proposed uses, it is excluded from the definition of a food additive, and thus may be marketed and sold for the designated uses identified above in the U.S. without the promulgation of a food additive regulation under 21 CFR."

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APPENDIX I : Flory Publication: "Molecular Size Distribution in Three Dimensional Polymers"

APPENDIX II : Flory Molecular Distribution Tables of Various Alkyl Polyglycosides

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WEIGHT PERCENT X-MER VS DP
MW(POH)= 116 00
PROBABILITIES ARE 0 17 0 23 0.16 0.44

DP	1 020	1 030	1 040	1 050	1.060	1 070	1.080	1 090	1.100	1 110	1 120	1 130	1 140	1 150	1 160	1 170	1 180	1.190	1 200
DP1/DP2	32 66322	13816	87513	71911	.61510	113 8	986 8	111	7.411	6.838	6 362	5 959	5 613	5 314	5 053	4 822	4 617	4 434	4 270
ALPHA	0.005	0 007	0 010	0 012	0 014	0 016	0 019	0 021	0.023	0 025	0 027	0 029	0 031	0 033	0 034	0.036	0 038	0 040	0.042
X-MER																			
1	96 92	95 45	94 01	92 62	91 26	89.94	88.65	87 39	86.17	84 98	83.82	82 68	81.58	80.50	79.45	78.42	77 42	76 44	75 48
2	2 97	4 31	5 57	6 75	7 86	8 89	9 86	10.77	11 63	12.43	13.18	13 88	14.53	15 15	15.72	16 26	16 77	17 24	17 68
3	0 11	0 23	0 38	0.57	0.79	1 03	1 28	1.55	1.83	2.12	2.41	2 71	3 02	3 32	3 62	3.93	4 23	4 53	4 82
4	0 00	0 01	0 03	0.05	0 08	0 13	0.18	0.24	0.31	0.39	0.47	0 57	0 67	0 78	0 89	1 01	1 14	1 27	1 40
5	0.00	0 00	0.00	0 00	0.01	0 02	0 03	0 04	0 05	0 07	0.10	0 12	0 15	0 19	0 23	0 27	0 32	0 37	0 42
6	0 00	0.00	0.00	0.00	0 00	0 00	0.00	0.01	0 01	0 01	0.02	0 03	0 04	0 05	0 06	0 07	0 09	0 11	0 13
7	0 00	0 00	0.00	0.00	0.00	0 00	0.00	0 00	0.00	0.00	0 00	0.01	0 01	0 01	0.02	0 02	0.03	0 03	0 04
8	0 00	0 00	0 00	0.00	0 00	0 00	0 00	0 00	0.00	0 00	0.00	0 00	0 00	0 00	0 00	0 01	0 01	0 01	0 01
9	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0.00	0 00	0 00	0 00	0 00	0 00	0.00	0 00	0 00
10	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0.00	0.00	0 00	0.00	0.00	0 00	0 00	0 00	0.00	0 00	0 00	0 00
11	0 00	0 00	0 00	0.00	0.00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00
12	0 00	0 00	0.00	0 00	0 00	0 00	0.00	0 00	0.00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00
13	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00
14	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00
15	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0.00	0 00	0 00
16	0 00	0.00	0 00	0 00	0 00	0 00	0.00	0 00	0 00	0.00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00
17	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0.00	0 00	0 00	0 00	0 00	0.00	0 00
18+	0 00	0 00	0.00	0 00	0 00	0 00	0 00	0 00	0.00	0.00	0.00	0.00	0 00	0.00	0 00	0.00	0 00	0.00	0.00
DP 18+	18 00	18 00	18.00	18 00	18 00	18 00	18 00	18.00	18.00	18 00	18 00	18.00	18.00	18.00	18 00	18.00	18.00	18 00	18 00

WEIGHT PERCENT X-MER VS DP
MW(POH)= 116 00
PROBABILITIES ARE 0 17 0 23 0 16 0 44

DP	1 210	1 220	1 230	1 240	1 250	1 260	1 270	1 280	1 290	1.300	1.310	1 320	1 330	1 340	1.350	1 360	1 370	1 380	1 390
DP1/DP2	4 121	3 986	3.863	3 750	3 646	3 551	3 462	3.380	3.304	3 233	3 166	3.104	3 046	2 991	2 939	2 891	2 845	2 801	2 760
ALPHA	0 043	0 045	0.047	0 048	0 050	0 052	0.053	0 055	0.056	0 058	0 059	0.061	0 062	0.063	0 065	0 066	0 068	0 069	0 070
X-MER																			
1	74 54	73 63	72 74	71 86	71 01	70 17	69 35	68.55	67 77	67 00	66 25	65.52	64.80	64.09	63.40	62 72	62.06	61.41	60.77
2	18 09	18 47	18 83	19 16	19 47	19.76	20 03	20 28	20.51	20.73	20.92	21.11	21.27	21 43	21.57	21.70	21.82	21 92	22 02
3	5 11	5 39	5.67	5 95	6 21	6 48	6 73	6.98	7.22	7.46	7 68	7 91	8.12	8.33	8.53	8 72	8.91	9 10	9 27
4	1 54	1 68	1 83	1 97	2.12	2.27	2 42	2.57	2.72	2.87	3.02	3.17	3.31	3.46	3.61	3 75	3 89	4 03	4 17
5	0 48	0 55	0 61	0 68	0.75	0.82	0.90	0.98	1.06	1.14	1.23	1 32	1 40	1 49	1 58	1 67	1 76	1 86	1 95
6	0 15	0 18	0 21	0 24	0 27	0.31	0.34	0.38	0 42	0.47	0 51	0 56	0.61	0 66	0 71	0 76	0 82	0 87	0 93
7	0 05	0.06	0 07	0.09	0 10	0.12	0 13	0 15	0 17	0.19	0.22	0 24	0 27	0.29	0 32	0 35	0 39	0 42	0 45
8	0 02	0 02	0.03	0 03	0.04	0 04	0.05	0.06	0.07	0.08	0 09	0 11	0 12	0 13	0 15	0 17	0.18	0 20	0 22
9	0 01	0 01	0 01	0 01	0.01	0 02	0 02	0 02	0 03	0 03	0 04	0 05	0 05	0 06	0 07	0 08	0 09	0 10	0 11
10	0.00	0 00	0.00	0.00	0 01	0 01	0 01	0 01	0 01	0 01	0 02	0 02	0 02	0 03	0 03	0 04	0 04	0 05	0 05
11	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 01	0 01	0 01	0 01	0 01	0 01	0 02	0 02	0.02	0 02	0 03
12	0 00	0 00	0 00	0 00	0.00	0 00	0 00	0 00	0 00	0.00	0 00	0 00	0 01	0 01	0 01	0 01	0.01	0.01	0 01
13	0 00	0 00	0 00	0 00	0 00	0 00	0.00	0 00	0 00	0.00	0.00	0.00	0 00	0 00	0.00	0 00	0.00	0 01	0 01
14	0.00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0.00	0.00	0.00	0 00	0 00	0 00	0 00
15	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0.00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00
16	0 00	0 00	0.00	0 00	0.00	0 00	0 00	0 00	0 00	0.00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00
17	0 00	0.00	0.00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0.00	0 00	0 00	0 00	0 00
18+	0.00	0.00	0 00	0.00	0 00	0 00	0 00	0.00	0 00	0 00	0.00	0 00	0.00	0.00	0 00	0.00	0.00	0 00	0.00
DP 18+	18 00	18 00	18 00	18.00	18 00	18.00	18 00	18 00	18 00	18.00	18 00	18 00	18 00	18 00	18 00	18.00	18 00	18 00	18 00

WEIGHT PERCENT X-MER VS DP
MW(FOR)= 116 00
PROBABILITIES ARE 0 17 0.23 0 16 0.44

DP	1 400	1.410	1 420	1 430	1.440	1.450	1.460	1.470	1.480	1.490	1.500	1 510	1.520	1 530	1 540	1 550	1 560	1.570	1.580	
DP1/DP2	2 721	2 684	2 648	2 615	2 583	2 552	2 523	2.495	2.468	2 443	2 418	2 394	2 372	2 350	2.329	2 309	2.290	2 271	2.253	
ALPHA	0 071	0 073	0 074	0 075	0 076	0.078	0.079	0 080	0 081	0 082	0.083	0.084	0.086	0 087	0 088	0 089	0 090	0 091	0.092	
X-MER																				
1	60 14	59 53	58 92	58 33	57.75	57 18	56 62	56 07	55 53	55 00	54 48	53 97	53 47	52 98	52.49	52.01	51.55	51 09	50 63	
2	22 10	22 18	22 25	22 31	22 36	22.41	22.44	22 48	22 50	22 52	22.53	22.54	22.54	22.54	22.54	22.52	22.51	22 49	22 47	
3	9 44	9.60	9.76	9.91	10.06	10.20	10 33	10 46	10 59	10 71	10.82	10.93	11.03	11.13	11.23	11 32	11 41	11 49	11.57	
4	4 31	4 44	4 58	4 71	4 84	4.96	5 08	5 21	5.32	5.44	5 55	5.66	5 77	5 88	5 98	6 08	6 18	6 28	6.37	
5	2 04	2.13	2 23	2.32	2.41	2.50	2.60	2 69	2 78	2 87	2 96	3.04	3 13	3 22	3 30	3 39	3 47	3 55	3 64	
6	0 99	1 05	1 11	1.17	1 23	1 29	1 36	1.42	1 48	1 55	1.61	1.67	1.74	1 80	1.87	1 93	2.00	2 06	2.12	
7	0 49	0 52	0 56	0 60	0 64	0 68	0 72	0 76	0 80	0 85	0 89	0 94	0 98	1 03	1 07	1 12	1 17	1 21	1 26	
8	0 24	0 26	0 29	0 31	0 33	0 36	0 39	0.41	0 44	0 47	0 50	0.53	0 56	0 59	0 62	0 66	0 69	0 72	0 76	
9	0 12	0 13	0 15	0 16	0 18	0 19	0 21	0 23	0.24	0 26	0.28	0 30	0 32	0 34	0 36	0 39	0.41	0 43	0 46	
10	0 06	0 07	0 08	0 09	0 09	0.10	0.11	0.12	0 14	0 15	0 16	0.17	0 19	0.20	0.22	0.23	0.25	0 26	0 28	
11	0 03	0 04	0 04	0 05	0 05	0 06	0 06	0 07	0 08	0 08	0 09	0.10	0 11	0 12	0 13	0 14	0 15	0.16	0 17	
12	0 02	0.02	0 02	0 02	0 03	0 03	0 03	0 04	0 04	0 05	0 05	0 06	0 06	0 07	0 08	0 08	0 09	0 10	0 11	
13	0.01	0 01	0 01	0 01	0.01	0.02	0 02	0 02	0 02	0.03	0.03	0 03	0 04	0.04	0 05	0 05	0 05	0 06	0 06	
14	0.00	0 00	0.01	0.01	0.01	0.01	0.01	0 01	0 01	0.02	0.02	0 02	0 02	0.02	0.03	0.03	0.03	0 04	0.04	
15	0 00	0 00	0 00	0 00	0 00	0 01	0 01	0 01	0 01	0 01	0 01	0 01	0 01	0 01	0 02	0 02	0 02	0.02	0 03	
16	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 01	0 01	0 01	0 01	0 01	0 01	0 01	0 01	0 01	0 02	
17	0 00	0 00	0 00	0 00	0 00	0.00	0.00	0 00	0 00	0 00	0 00	0.00	0.00	0 01	0 01	0 01	0 01	0.01	0 01	
18+	0 00	0.00	0.00	0.00	0 00	0.00	0 00	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0 01	0.01	0.01	0 02	
DP 18+	18.00	18.00	18.00	18 00	18 00	18 00	18 00	18 00	18 00	18 00	18 00	18 00	18 00	18 00	18 00	18.00	18.02	18.14	18 59	

WEIGHT PERCENT X-MER VS DP
MW(FOR)= 116 00
PROBABILITIES ARE 0 17 0 23 0 16 0 44

DP	1.590	1.600	1.610	1 620	1.630	1 640	1 650	1 660	1 670	1 680	1 690	1.700	1.710	1.720	1 730	1.740	1 750	1.760	1 770	
DP1/DP2	2 236	2 219	2 203	2 188	2 173	2 158	2 144	2 130	2 117	2 104	2 092	2 080	2 068	2 057	2 046	2 035	2 025	2 015	2 005	
ALPHA	0 093	0 094	0 095	0 096	0 097	0 098	0.098	0 099	0 100	0 101	0 102	0 103	0 104	0.105	0 105	0.106	0.107	0.108	0.109	
X-MER																				
1	50 19	49 75	49 32	48 89	48 48	48 07	47 66	47 26	46 87	46 49	46 11	45 73	45 37	45 00	44 65	44 30	43 95	43 61	43 27	
2	22 44	22 42	22 38	22 35	22 31	22 27	22 23	22 19	22 14	22 09	22 04	21 99	21.94	21.88	21 82	21 77	21 71	21 65	21 58	
3	11.65	11 72	11 79	11 85	11 91	11 97	12.03	12.08	12.13	12.18	12 22	12 26	12 30	12 33	12.37	12 40	12 43	12 45	12 48	
4	6.46	6.55	6.63	6.72	6.80	6.88	6 95	7.03	7 10	7.17	7.24	7.30	7 37	7 43	7 49	7.55	7 60	7.66	7 71	
5	3 72	3 79	3 87	3 95	4 02	4 10	4 17	4 24	4 31	4 38	4 45	4 51	4 58	4 64	4 70	4 76	4 82	4 88	4 94	
6	2 19	2 25	2 31	2 37	2.44	2 50	2.56	2 62	2.68	2 74	2 79	2 85	2.91	2.97	3 02	3 08	3 13	3 18	3.24	
7	1.31	1.35	1 40	1 45	1.50	1.55	1 59	1 64	1.69	1.74	1.78	1.83	1.88	1.93	1.97	2.02	2 06	2.11	2.15	
8	0 79	0.83	0.86	0.90	0.93	0.97	1 00	1 04	1.08	1.12	1.15	1 19	1.23	1 26	1 30	1.34	1 38	1 41	1 45	
9	0 48	0 51	0 53	0.56	0 58	0 61	0 64	0 67	0.69	0 72	0.75	0.78	0.81	0 84	0.87	0.90	0 93	0 96	0.99	
10	0 30	0 31	0.33	0 35	0.37	0.39	0 41	0 43	0 45	0 47	0.49	0 51	0.54	0.56	0.58	0.60	0.63	0 65	0 67	
11	0 18	0 20	0.21	0 22	0 23	0 25	0 26	0 28	0 29	0 31	0 32	0.34	0 36	0.37	0.39	0.41	0.43	0.44	0 46	
12	0 11	0.12	0.13	0.14	0 15	0.16	0.17	0 18	0 19	0 20	0 21	0 23	0 24	0 25	0 27	0.28	0 29	0.31	0 32	
13	0.07	0 08	0 08	0 09	0 10	0 10	0 11	0.12	0.13	0 13	0.14	0 15	0 16	0.17	0.18	0 19	0 20	0 21	0 22	
14	0 04	0 05	0 05	0 06	0 06	0 07	0 07	0 08	0 08	0 09	0 10	0.10	0 11	0 12	0 12	0.13	0 14	0 15	0.15	
15	0 03	0 03	0 03	0 04	0 04	0 04	0 05	0.05	0.05	0 06	0 06	0 07	0.07	0.08	0 08	0.09	0 10	0 10	0 11	
16	0.02	0.02	0.02	0.02	0.03	0 03	0.03	0 03	0 04	0.04	0.04	0.05	0.05	0.05	0.06	0.06	0 07	0 07	0 08	
17	0 01	0 01	0.01	0 01	0 02	0 02	0 02	0 02	0 02	0 03	0 03	0 03	0 03	0.04	0 04	0 04	0 05	0 05	0 05	
18+	0 02	0 02	0 02	0.03	0.03	0 03	0 04	0 04	0 05	0 05	0 06	0 07	0 07	0 08	0 09	0 10	0 11	0 11	0 13	
DP 18+	18 55	18 56	18 84	18 89	18 80	19 07	19 22	19 24	19 31	19 44	19 51	19 60	19 61	19 63	19 75	19 74	19 81	19 85	19 93	

WEIGHT PERCENT X-MER VS DP
MW(FOH)= 116 00
PROBABILITIES ARE 0 17 0 23 0 16 0 44

DP	1 780	1 790	1 800	1 810	1 820	1 830	1 840	1 850	1 860	1 870	1 880	1 890	1 900	1 910	1 920	1 930	1 940	1 950	1 960
DP1/DP2	1 995	1 986	1 977	1 968	1 960	1 951	1 943	1 935	1 928	1 320	1 913	1 906	1 879	1 892	1 885	1 879	1 872	1 866	1 860
ALPHA	0 110	0 110	0 111	0 112	0 113	0 113	0 114	0 115	0 116	0.116	0.117	0.118	0.118	0 119	0 120	0 .20	0 121	0 122	0 .22
X-MER																			
1	42 94	42 61	42 29	41 98	41.66	41.36	41.05	40 75	40 46	40 16	39 88	39 59	39 31	39 04	38 77	38.50	38 23	37 97	37 71
2	21 52	21 46	21 39	21 33	21.26	21 19	21.13	21 06	20 99	20 92	20 85	20 78	20 71	20 64	20 56	20.49	20 42	20 35	20 28
3	12 50	12 52	12 54	12 56	12.57	12 58	12 60	7 61	12 61	12 62	12 63	12 63	12 63	12 63	12 63	12.63	12 63	12 63	12.62
4	7 76	7 81	7 85	7 90	7.94	7 98	8 02	8 06	8 10	8 13	8 17	8 20	8 23	8 26	8 29	8 32	8 35	8 37	8 39
5	4 99	5 05	5 10	5 15	5 20	5 25	5 30	5 35	5 39	5 44	5 48	5 52	5 56	5 60	5 64	5 68	5 72	5 75	5 79
6	3 29	3 34	3.39	3 44	3 49	3 54	3 58	3 63	3 67	3 72	3 76	3.81	3 85	3 89	3.93	3 97	4 01	4 05	4 09
7	2 20	2 24	2 29	2 33	2 37	2 42	2 46	2 50	2 54	2 58	2.62	2 66	2 70	2 74	2 78	2 82	2 86	2 89	2 93
8	1 49	1 53	1 56	1 60	1.64	1 67	1 71	1 74	1 78	1 82	1.85	1 89	1 92	1 95	1 99	2 02	2.06	2 09	2 12
9	1 02	1 05	1 08	1 11	1 14	1 17	1 20	1 23	1 26	1 29	1 32	1 35	1 38	1 41	1 44	1 46	1 49	1 52	1 55
10	0 70	0 72	0 75	0 77	0 79	0 82	0 84	0 87	0 89	0 92	0 94	0 97	0 99	1 02	1 04	1 07	1 09	1 12	1 14
11	0 48	0 50	0.52	0 54	0 56	0 58	0 60	0 62	0 64	0.66	0 68	0 70	0 72	0 74	0 76	0 78	0 80	0 82	0 85
12	0 33	0 35	0 36	0 38	0 39	0.41	0 43	0 44	0 46	0 47	0 49	0 51	0 52	0 54	0 56	0 58	0.59	0 61	0 63
13	0 23	0 24	0 26	0 27	0 28	0 29	0 30	0 32	0 33	0 34	0 36	0 37	0 38	0 40	0 41	0 43	0 44	0 45	0 47
14	0 16	0 17	0 18	0 19	0 20	0 21	0 22	0 23	0 24	0 25	0 26	0 27	0 28	0 29	0 30	0 32	0 33	0 34	0 35
15	0 11	0 12	0 13	0 13	0 14	0 15	0 16	0 16	0 17	0 18	0 19	0 20	0 21	0 22	0 23	0 23	0 24	0 25	0 26
16	0 08	0 09	0 09	0 10	0 10	0 11	0 11	0 12	0 13	0 13	0 14	0 15	0.15	0 16	0.17	0 17	0 18	0 19	0 20
17	0 06	0 06	0 06	0 07	0 07	0 08	0 08	0 09	0 09	0 10	0 10	0 11	0 11	0 12	0 12	0 13	0 .4	0 14	0 15
18+	0 14	0 15	0 16	0 17	0 19	0 20	0 22	0 23	0 25	0 27	0 29	0 31	0 33	0 35	0 37	0 39	0 42	0 44	0 47
DP 18+	19 39	20 01	20 05	20 11	20 15	20 18	20 20	20 23	20 30	20 33	20 37	20 41	20 46	20 47	20 52	20 55	20 58	20 64	20 67

WEIGHT PERCENT X-MER VS DP
MW(FOH)= 116.00
PROBABILITIES ARE 0 17 0 23 0 16 0 44

DP	1 970	1 980	1 990	2 000	2 010	2 020	2 030	2 040	2 050	2 060	2 070	2 080	2 090	2 100	2 110	2 120	2 130	2 140	2 150
DP1/DP2	1 854	1 848	1 842	1 837	1.831	1.826	1 821	1 816	1 811	1 806	1 801	1 796	1 792	1 787	1 783	1 779	1 774	1 770	1 766
ALPHA	0 123	0 124	0 124	0 125	0 126	0 126	0 127	0 127	0 128	0 129	0 129	0 130	0 130	0 131	0 132	0 132	0 133	0 133	0 .34
X-MER																			
1	37 46	37 20	36 96	36 71	36 47	36 23	35 99	35 76	35 53	35 30	35 08	34 85	34 63	34 42	34 20	33 99	33 78	33 58	33 37
2	20 20	20.13	20 06	19 99	19 91	19 84	19 77	19 69	19.62	19 55	19 47	19 40	19 33	19.26	19 18	19.11	19.04	18 97	18 90
3	12 62	12 61	12 60	12 59	12 59	12 58	12 56	12 55	12 54	12 53	12 51	12 50	12 48	12 47	12 45	12 43	12 41	12 40	12 38
4	8 42	8 44	8 46	8 48	8 50	8 51	8 53	8 55	8 56	8 57	8 59	8 60	8 61	8 62	8 63	8 64	8 65	8 65	8 66
5	5 82	5 86	5 89	5.92	5 95	5 98	6.01	6 03	6.06	6 09	6 11	6 14	6 16	6 18	6 20	6 22	6 24	6 26	6 28
6	4 12	4 16	4 19	4 23	4 26	4 30	4 33	4 36	4 39	4 42	4 45	4 48	4 51	4 53	4 56	4 59	4 61	4 64	4 66
7	2 96	3 00	3 03	3 07	3 10	3 13	3 17	3 20	3 23	3 26	3 29	3 32	3 35	3 38	3 41	3 43	3 46	3 49	3 51
8	2 16	2.19	2 22	2 25	2 28	2 31	2 34	2 37	2.40	2 43	2 46	2 49	2 52	2 55	2 57	2 60	2 63	2 65	2 68
9	1 58	1 61	1 64	1 67	1 69	1 72	1 75	1 78	1 80	1 83	1 86	1 88	1 91	1 94	1 96	1 99	2 01	2 04	2 06
10	1 17	1 19	1 22	1 24	1 27	1 29	1 31	1 34	1 36	1 39	1 41	1 43	1 46	1 48	1 50	1 53	1 55	1 57	1 60
11	0 87	0 89	0 91	0 93	0 95	0 97	0 99	1 01	1 04	1 06	1.08	1 10	1 12	1 14	1 16	1 18	1 20	1 22	1 24
12	0 65	0 66	0 68	0 70	0 72	0 74	0 75	0 77	0 79	0 81	0 83	0 84	0 86	0 88	0 90	0 92	0 94	0 95	0 97
13	0 48	0 50	0 51	0 53	0 54	0 56	0 57	0 59	0 61	0 62	0 64	0 65	0 67	0 68	0 70	0 72	0 73	0 75	0 76
14	0 36	0 38	0 39	0.40	0 41	0 43	0 44	0 45	0 47	0 48	0 49	0 51	0 52	0 53	0 55	0 56	0 57	0 59	0 60
15	0 27	0 28	0.29	0 30	0 31	0 33	0 34	0 35	0 36	0 37	0 38	0 39	0 40	0 42	0 43	0 44	0 45	0 46	0 47
16	0 21	0 21	0 22	0 23	0 24	0 25	0 26	0 27	0 28	0 29	0 30	0 31	0 31	0 32	0 33	0 34	0 35	0 36	0 38
17	0 16	0 16	0.17	0 18	0.18	0 19	0 20	0 21	0 21	0.22	0.23	0 24	0 25	0 25	0 26	0 27	0 28	0 29	0.30
18+	0 50	0 53	0.55	0 59	0 62	0 65	0 68	0 72	0 75	0 79	0 83	0 87	0.91	0.95	0 99	1.04	1.08	1 13	1 .8
DP 18+	20 71	20 73	20 76	20 80	20 83	20 87	20 90	20 94	20 98	21 02	21 05	21 09	21 12	21 16	21 19	21 22	21 26	21 29	21 33

WEIGHT PERCENT X-MER VS DP
MW(POH)= 130 00
PROBABILITIES ARE 0 17 0 23 0 16 0 44

DP	1 020	1 030	1 040	1.050	1 060	1.070	1 080	1 090	1 100	1 110	1 120	1.130	1 140	1.150	1 160	1 170	1 180	1 190	1 200
DP1/DP233	25022.53	517	17813	96511.82	410.294	9 148	8 257	7.544	6 961	6.476	6.066	5.714	5 410	5.143	4 909	4 700	4 514	4 347	
ALPHA	0 005	0.007	0 010	0.012	0 014	0 016	0 019	0.021	0 023	0 025	0 027	0 029	0.031	0 033	0.034	0.036	0.038	0.040	0.042
X-MER																			
1	96 98	95 53	94 12	92 74	91 41	90 11	88 84	87 60	86 40	85.23	84.08	82 97	81.88	80 81	79.78	78 76	77 77	76 81	75 86
2	2 92	4 24	5 48	6 64	7.73	8 75	9 71	10 61	11 45	12.24	12 98	13 68	14.33	14 94	15 51	16 05	16.55	17 01	17 45
3	0 10	0 22	0 38	0 56	0 77	1.00	1 25	1 51	1.79	2.07	2.36	2 65	2.95	3.25	3.54	3.84	4.14	4 43	4 72
4	0 00	0 01	0 03	0 05	0 08	0 12	0 17	0 23	0 30	0.38	0 46	0 55	0 65	0 76	0.87	0.99	1.11	1 24	1 37
5	0 00	0 00	0 00	0 00	0 01	0.02	0 02	0.04	0 05	0 07	0 09	0 12	0 15	0.18	0 22	0.26	0 31	0 36	0 41
6	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0.01	0 01	0 01	0 02	0 03	0 04	0 05	0 06	0 07	0 09	0 11	0 13
7	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0.00	0 00	0 00	0.00	0 01	0 01	0 01	0 02	0 02	0 03	0 03	0 04
8	0 00	0 00	0 00	0.00	0 00	0.00	0 00	0.00	0 00	0.00	0.00	0 00	0.00	0 00	0.00	0 01	0 01	0 01	0 01
9	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0.00	0 00	0 00	0 00	0 00	0 00	0 00	0 00
10	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0.00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00
11	0 00	0.00	0 00	0 00	0 00	0 00	0 00	0.00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00
12	0.00	0.00	0.00	0.00	0.00	0.00	0 00	0 00	0.00	0.00	0 00	0 00	0.00	0 00	0 00	0 00	0.00	0.00	0.00
13	0 00	0 00	0 00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0 00	0 00	0.00	0.00	0.00
14	0 00	0 00	0 00	0 00	0 00	0 00	0.00	0.00	0 00	0.00	0.00	0 00	0 00	0 00	0.00	0.00	0.00	0 00	0 00
15	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0.00	0 00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
16	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0.00	0 00	0 00	0 00	0 00	0 00	0 00	0.00
17	0 00	0 00	0 00	0.00	0 00	0 00	0 00	0 00	0 00	0.00	0 00	0.00	0 00	0.00	0 00	0 00	0 00	0 00	0 00
18+	0.00	0 00	0 00	0 00	0.00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00
DP 18+	18 00	18 00	18 00	18 00	18 00	18 00	18 00	18 00	18 00	18 00	18 00	18.00	18 00	18 00	18 00	18.00	18 00	18 00	18 00

WEIGHT PERCENT X-MER VS DP
MW(POH)= 130 00
PROBABILITIES ARE 0 17 0 23 0 16 0 44

DP	1 210	1 220	1 230	1 240	1 250	1 260	1 270	1 280	1 290	1 300	1 310	1 320	1 330	1 340	1 350	1 360	1 370	1 380	1 390
DP1/DP2	4 195	4 057	3.932	3.817	3 712	3 614	3.524	3 441	3 363	3 291	3 223	3 160	3 101	3 045	2 992	2 943	2 896	2 851	2 809
ALPHA	0 043	0 045	0 047	0.048	0.050	0 052	0 053	0 055	0 056	0.058	0 059	0 061	0 062	0 063	0 065	0 066	0 068	0 069	0 070
X-MER																			
1	74.94	74 03	73 15	72 29	71 44	70 62	69 81	69 02	68 24	67.49	66 74	66 02	65 30	64 60	63.92	63 25	62 59	61 94	61 31
2	17 86	18 25	18 60	18 94	19 25	19 54	19 81	20 06	20 29	20 51	20 71	20 89	21 06	21 22	21 36	21.49	21 61	21 72	21 82
3	5 00	5 28	5 56	5.83	6 09	6 35	6 60	6 85	7 08	7.32	7 54	7 76	7 97	8 18	8 38	8 57	8 76	8 94	9 11
4	1 50	1 64	1 78	1 92	2 07	2 21	2 36	2 51	2 65	2 80	2 95	3 09	3 24	3 38	3 52	3 67	3.81	3.95	4 08
5	0 47	0 53	0 59	0 66	0 73	0 80	0 88	0 95	1 03	1 11	1 20	1 28	1 37	1 45	1 54	1 63	1 72	1 81	1 90
6	0.15	0.18	0.20	0 23	0 26	0 30	0 33	0 37	0.41	0 45	0 50	0 54	0 59	0 64	0 69	0 74	0 80	0 85	0 91
7	0 05	0 06	0 07	0 08	0.10	0.11	0 13	0.15	0.17	0 19	0.21	0 23	0 26	0 29	0.31	0 34	0 37	0 41	0 44
8	0 02	0 02	0.02	0 03	0 04	0 04	0.05	0.06	0.07	0.08	0 09	0.10	0 12	0 13	0 14	0 16	0 18	0 20	0 22
9	0 01	0 01	0.01	0.01	0.01	0 02	0.02	0.02	0.03	0 03	0.04	0.04	0.05	0 06	0 07	0.08	0 09	0 10	0 11
10	0.00	0 00	0 00	0.00	0.01	0 01	0 01	0 01	0.01	0.01	0.02	0.02	0.02	0.03	0.03	0 04	0.04	0 05	0.05
11	0.00	0 00	0 00	0.00	0 00	0.00	0.00	0.00	0.00	0 01	0 01	0.01	0 01	0 01	0.01	0.02	0.02	0 02	0 03
12	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0.00	0 00	0 00	0 00	0.00	0 01	0.01	0.01	0.01	0 01	0.01
13	0 00	0 00	0 00	0.00	0 00	0 00	0 00	0 00	0.00	0 00	0 00	0 00	0 00	0 00	0 00	0.00	0 00	0 01	0 01
14	0.00	0.00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0.00	0 00	0 00	0 00	0.00	0 00	0.00	0 00	0 00	0 00
15	0.00	0.00	0.00	0.00	0.00	0 00	0.00	0 00	0.00	0 00	0 00	0 00	0 00	0.00	0 00	0 00	0.00	0 00	0 00
16	0.00	0.00	0.00	0 00	0 00	0.00	0.00	0.00	0.00	0 00	0.00	0 00	0.00	0 00	0.00	0 00	0 00	0 00	0 00
17	0 00	0 00	0 00	0.00	0 00	0 00	0.00	0.00	0.00	0 00	0.00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00
18+	0 00	0.00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0.00	0.00	0 00	0 00	0 00	0 00	0 00	0 00	0 00
DP 18+	18 00	18 00	18 00	18 00	18.00	18 00	18 00	18 00	18 00	18 00	18 00	18 00	18 00	18 00	18 00	18 00	18 00	18 00	18 00

WEIGHT PERCENT X-MER VS DP
MW(FOR)- 130 00
PROBABILITIES ARE 0.17 0.23 0 16 0 44

DP	1 400	1 410	1 420	1 430	1 440	1 450	1 460	1 470	1 480	1.490	1.500	1 510	1 520	1 530	1.540	1 550	1 560	1 570	1 580			
DP1/DP2	2 770	2 732	2 696	2 662	2 629	2 598	2 568	2 540	2 512	2 486	2 461	2 437	2 414	2 392	2 371	2.351	2.331	2 312	2 294			
ALPHA	0.071	0 073	0 074	0.075	0.076	0 078	0.079	0 080	0 081	0.082	0 083	0 084	0 086	0 087	0 088	0 089	0.090	0 091	0.092			
X-MER																						
1	60 69	60 08	59 48	58 90	58 32	57.76	57.20	56.66	56 12	55 59	55 08	54.57	54.07	53 58	53 10	52.63	52.16	51.70	51.25			
2	21.91	21 99	22 06	22.13	22 18	22 23	22 27	22 31	22 34	22 36	22 38	22 39	22 39	22 40	22.39	22 39	22 38	22.36	22 34			
3	9 28	9 44	9 60	9.75	9 90	10 04	10 17	10 30	10 42	10 54	10 66	10 77	10 87	10 97	11 07	11 16	11.25	11.33	11 41			
4	4 22	4.35	4.48	4.61	4.73	4.86	4.98	5 10	5 22	5 33	5.44	5 55	5 66	5 76	5.87	5 97	6.06	6 16	6 25			
5	1 99	2.08	2 17	2 26	2.35	2 44	2 53	2 62	2 71	2 80	2 89	2 97	3 06	3 15	3 23	3.31	3 40	3 48	3 56			
6	0.96	1 02	1 08	1 14	1 20	1 26	1.32	1.38	1.44	1 51	1 57	1 63	1.70	1 76	1.82	1.88	1 95	2 01	2 07			
7	0.47	0.51	0.54	0.58	0.62	0.66	0.70	0 74	0 78	0.82	0 87	0.91	0 95	1 00	1 04	1.09	1 14	1.18	1 23			
8	0 24	0 26	0 28	0 30	0 32	0 35	0.37	0.40	0 43	0 46	0 48	0 51	0 54	0 57	0 61	0 64	0 67	0 70	0 74			
9	0 12	0 13	0 14	0 16	0 17	0 19	0 20	0 22	0.24	0.25	0 27	0.29	0.31	0.33	0.35	0 38	0 40	0.42	0 44			
10	0 06	0.07	0 07	0 08	0.09	0.10	0.11	0 12	0 13	0.14	0 16	0 17	0 18	0 19	0 21	0 22	0.24	0.25	0 27			
11	0 03	0 03	0 04	0 04	0.05	0 05	0 06	0 07	0 07	0 08	0 09	0 10	0 11	0 11	0 12	0 13	0 14	0 15	0 17			
12	0 02	0 02	0.02	0 02	0 03	0 03	0 03	0 04	0 04	0 05	0 05	0 06	0 06	0.07	0.07	0.08	0 09	0.09	0 10			
13	0 01	0.01	0.01	0 01	0.01	0.02	0.02	0.02	0 02	0 03	0 03	0 03	0 04	0.04	0.04	0.05	0 05	0.06	0 06			
14	0 00	0 00	0 01	0 01	0 01	0 01	0 01	0 01	0 01	0 01	0 02	0 02	0 02	0 02	0 03	0 03	0 03	0 04	0 04			
15	0 00	0 00	0.00	0 00	0 00	0.00	0 01	0 01	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0 02	0 02	0.02	0.02			
16	0 00	0 00	0.00	0.00	0.00	0.00	0 00	0 00	0.00	0.00	0.01	0 01	0.01	0 01	0 01	0 01	0 01	0.01	0.02			
17	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0.00	0 01	0 01	0 01	0 01	0 01	0 01			
18+	0.00	0.00	0 00	0.00	0.00	0.00	0 00	0.00	0 00	0 00	0.00	0 01	0.01	0.01	0.01	0 01	0 01	0 01	0.02			
DP 18+	18.00	18 ^^	18 00	18 00	18 00	18 00	18 00	18 00	18 00	18 00	18 00	18 00	18 00	18.00	18 00	18.00	18.02	18 14	18 59			

WEIGHT PERCENT X-MER VS DP
MW(FOR)- 130 00
PROBABILITIES ARE 0.17 0.23 0 16 0 44

DP	1 590	1 600	1 610	1 620	1 630	1 640	1 650	1 660	1.670	1.680	1 690	1 700	1.710	1 720	1.730	1 740	1 750	1.760	1.770			
DP1/DP2	2 276	2 259	2 243	2 227	2.212	2 197	2 182	2 169	2 155	2 142	2 129	2 117	2 105	2 094	2 083	2 072	2.061	2.051	2 041			
ALPHA	0 093	0.094	0.095	0 096	0.097	0.098	0.098	0.099	0.100	0.101	0 102	0.103	0.104	0.105	0 105	0.106	0.107	0 108	0.109			
X-MER																						
1	50 81	50 37	49.94	49.52	49.11	48.70	48.30	47.90	47.51	47.13	46 75	46.38	46.01	45.65	45.30	44.95	44.60	44 26	43.93			
2	22 32	22 30	22 27	22 24	22 20	22 17	22 13	22 09	22 05	22 00	21 95	21 91	21 86	21 80	21 75	21 69	21 64	21 58	21 52			
3	11 49	11 56	11 63	11 70	11 76	11 82	11 87	11 93	11 98	12 02	12 07	12.11	12.15	12.19	12.22	12.26	12.29	12.31	12.34			
4	6.34	6.43	6.51	6.60	6.68	6.76	6 83	6 91	6 98	7 05	7 11	7.18	7.24	7.31	7.37	7.42	7.48	7 53	7.58			
5	3 64	3 71	3 79	3 86	3 94	4 01	4 08	4 15	4 22	4 29	4 36	4 42	4 49	4 55	4 61	4 67	4 73	4 79	4 84			
6	2 13	2 20	2 26	2 32	2 38	2 44	2 50	2 56	2 62	2 68	2 73	2 79	2 85	2.90	2.96	3 01	3 06	3 12	3.17			
7	1 27	1.32	1 37	1 41	1 46	1 51	1 56	1 60	1.65	1 70	1 74	1.79	1 83	1.88	1 93	1 97	2 02	2 06	2 11			
8	0 77	0 80	0 84	0 87	0 91	0 94	0 98	1 01	1 05	1 09	1 12	1 16	1 20	1.23	1 27	1 31	1 34	1 38	1 42			
9	0 47	0 49	0 52	0 54	0 57	0 60	0 62	0 65	0 68	0 70	0 73	0 76	0.79	0.82	0 84	0 87	0.90	0 93	0.96			
10	0 29	0 30	0.32	0.34	0.36	0.38	0.40	0.42	0.44	0 46	0 48	0 50	0 52	0 54	0.57	0 59	0.61	0 63	0 66			
11	0 18	0 19	0 20	0 21	0 23	0 24	0 26	0 27	0 28	0 30	0 32	0 33	0 35	0.36	0 38	0 40	0.42	0 43	0 45			
12	0.11	0 12	0.13	0 14	0.15	0.16	0.17	0 18	0 19	0 20	0 21	0 22	0.23	0.25	0.26	0.27	0.28	0.30	0 31			
13	0 07	0 07	0.08	0 09	0 09	0 10	0 11	0 11	0 12	0 13	0 14	0 15	0 16	0.17	0 18	0.18	0 19	0 21	0 22			
14	0 04	0 05	0 05	0 06	0 06	0 06	0.07	0 08	0 08	0 09	0.09	0 10	0.11	0 11	0 12	0.13	0 13	0 14	0 15			
15	0 03	0 03	0.03	0.04	0.04	0.04	0.05	0.05	0.05	0 06	0 06	0.07	0.07	0 08	0.08	0.09	0.09	0.10	0 10			
16	0.02	0.02	0.02	0.02	0 02	0 03	0 03	0.03	0.04	0.04	0.04	0 04	0 05	0 05	0.06	0 06	0.06	0.07	0 07			
17	0 01	0 01	0.01	0 01	0.02	0.02	0.02	0 02	0.02	0 03	0.03	0 03	0 03	0 04	0.04	0.04	0.04	0 05	0.05			
18+	0 02	0.02	0 02	0.03	0 03	0 03	0 04	0 04	0 05	0 05	0 06	0 06	0 07	0 08	0 09	0 09	0.10	0 11	0 12			
DP 18+	18 55	18 56	18 84	18 89	18.80	19 07	19 22	19 24	19 31	19 44	19 51	19 60	19 61	19 63	19 75	19.74	19 81	19 85	19 93			

WEIGHT PERCENT X-MER VS DP
MW(FOR)= 130 00
PROBABILITIES ARE 0 17 0 23 0 16 0 44

DP	1 780	1 790	1 800	1 810	1 870	1 830	1 840	1 850	1 860	1 870	1 880	1 890	1 900	1 910	1 920	1 930	1 940	1 950	1 960
DP1/DP2	2 03.	2 022	2 013	2 004	1 995	1 986	1 978	1 970	1 962	1 955	1 947	1 940	1 933	1 926	1 919	1 912	1 906	899	1 893
ALPHA	0 110	0 110	0 111	0 112	0 113	0 113	0 114	0 115	0 116	0 116	0 117	0 118	0 118	0 119	0 120	0 120	0 12.	0 127	0 122
X-MER																			
1	43 59	43 27	42 95	42 63	42 32	42 01	41 71	41 41	41 11	40 82	40 54	40 25	39 97	39 70	39 42	39 16	38 89	38 63	38 37
2	21 46	21 40	21 34	21 28	21 21	21 15	21 08	21.02	20 95	20 89	20 82	20 75	20 68	20 61	20 55	20 48	20 41	20 34	20 27
3	12 36	12 38	12.40	12 42	12 44	12 45	12 47	12 48	12 49	12 50	12 50	12 51	12 51	12 52	12 52	17 52	12 52	12 52	12 51
4	7 64	7 68	7 73	7 78	7 82	7 86	7 90	7 94	7 98	8 02	8 05	8 08	8 12	8 15	8 18	8 20	8 23	8 26	8 28
5	4 90	4.95	5.01	5 06	5.11	5 16	5 20	5 25	5 30	5 34	5 38	5 43	5 47	5 51	5 55	5 59	5 62	5 66	5 69
6	3 22	3 27	3 32	3 37	3 42	3 46	3 51	3 56	3 60	3 64	3 69	3 73	3 77	3 81	3 85	3 89	3 93	3 97	4 0.
7	2 15	2 19	2.24	2 28	2 32	2 36	2 41	2 45	2 49	2 53	2 57	2 61	2 65	2 68	2 72	2 76	2 80	2 83	2 87
8	1 45	1 49	1 53	1 56	1 60	1 63	1 67	1 70	1 74	1 77	1 81	1 84	1 88	1 91	1 95	1 98	2 01	2 04	2 08
9	0 99	1 02	1 05	1 08	1 11	1 14	1 17	1 20	1 23	1 26	1 29	1 31	1 34	1 37	1.40	. 43	1 46	1 49	1 52
10	0 68	0 70	0 73	0 75	0 77	0 80	0 82	0 85	0 87	0 90	0 92	0 94	0 97	0 99	1 02	1 04	1 07	1 09	1 12
11	0 47	0 49	0 51	0 53	0 54	0 56	0 58	0 60	0 62	0 64	0 66	0 68	0 70	0 72	0 74	0 76	0 78	0 80	0 83
12	0.33	0 34	0 35	0 37	0.38	0.40	0 41	0 43	0 45	0 46	0 48	0 49	0 51	0 53	0 54	0.56	0 58	0 60	0 61
13	0 23	0 24	0.25	0 26	0 27	0 28	0 30	0 31	0 32	0 33	0 35	0 36	0 37	0 39	0 40	0 41	0 43	0 44	0 46
14	0 16	0 17	0 18	0 18	0.19	0 20	0 21	0 22	0 23	0 24	0 25	0 26	0 27	0 29	0 30	0 31	0 32	0 33	0.34
15	0 11	0 12	0 12	0 13	0 14	0 15	0 15	0 16	0 17	0 18	0 18	0 19	0 20	0 21	0 22	0 23	0 24	0 25	0 26
16	0 08	0 08	0 09	0 09	0 10	0 10	0 11	0 12	0 12	0.13	0 14	0 14	0 15	0 16	0 16	0 17	0 18	0 19	0 19
17	0 05	0 06	0 06	0 07	0 07	0 07	0 08	0 08	0 09	0 09	0 10	0.10	0 11	0.12	0 12	0 13	0 13	0 14	0 15
18+	0 13	0 14	0 16	0 17	0 18	0 20	0 21	0 23	0 24	0 26	0 28	0.30	0 32	0 34	0 36	0 38	0 41	0 43	0 46
DP 18+	19 99	20 01	20 05	20 11	20 15	20 18	20 20	20 23	20 30	20 33	20 37	20 41	20 46	20 47	20 52	20 55	20 58	20 64	20 67

WEIGHT PERCENT X-MER VS DP
MW(FOR)= 130 00
PROBABILITIES ARE 0 17 0.23 0 16 0 44

DP	1 970	1 980	1 990	2 000	2 010	2 020	2 030	2 040	2 050	2 060	2 070	2 080	2 090	2 100	2 110	2 120	2 130	2 140	2 .50
DP1/DP2	1 887	1 881	1 876	1 870	1 864	1 859	1 854	1 848	1 843	1 838	1 833	1.829	1 824	1 819	1 815	1 811	1.806	1 802	. 798
ALPHA	0 123	0 124	0 124	0 125	0 126	0 126	0 127	0 127	0 128	0 129	0 129	0 130	0 130	0 131	0 132	0 132	0 133	0 133	0 134
X-MER																			
1	38 12	37 86	37 61	37 37	37 13	36 89	36 65	36 42	36 19	35 96	35 73	35 51	35 29	35 07	34 86	34 65	34 44	34 23	34 03
2	20 20	20 13	20 06	19 99	19 91	19 84	19 77	19 70	19 63	19 56	19 49	19 42	19 35	19 28	19 21	19 .4	19 07	19 00	8 93
3	12 51	12 50	12 50	12 49	12 48	12 47	12 46	12 45	12 44	12 43	12 42	12 40	12 39	12 38	12 36	12 34	12 33	12 31	2 29
4	8 30	8 33	8 35	8 37	8.39	8 41	8 42	8 44	8 45	8 47	8 48	8 49	8 51	8 52	8 53	8 54	8 54	8 55	8 56
5	5 73	5 76	5 79	5 82	5 85	5 88	5 91	5 94	5 97	5 99	6 02	6 04	6 06	6 09	6 11	6 13	6 15	6 17	6 19
6	4 05	4 08	4 12	4 15	4 18	4 22	4 25	4 28	4 31	4 34	4 37	4 40	4 43	4 46	4 48	4 51	4 53	4 56	4 58
7	2 90	2 94	2 97	3 01	3 04	3 07	3 10	3 14	3 17	3 20	3 23	3 26	3 29	3 32	3 34	3 37	3 40	3 42	3 45
8	2 11	2 14	2 17	2 20	2 23	2 26	2 29	2 32	2 35	2 38	2 41	2 44	2 47	2 50	2 52	2 55	2 58	2 60	2.63
9	1 55	1 57	1 60	1 63	1 66	1 68	1 71	1 74	1 76	1 79	1 82	1 84	1 67	1 90	1 92	1 95	1 97	1 99	2 02
10	1 14	1 16	1 19	1 21	1 24	1 26	1 29	1 31	1 33	1 36	1 38	1 40	1 43	1 45	1 47	1 49	1 52	1 54	1 56
11	0 85	0 87	0 89	0 91	0 93	0 95	0 97	0 99	1 01	1 03	1 05	1 07	1 09	1 11	1 13	1 15	1 18	1 20	1 22
12	0.63	0 65	0 67	0 68	0 70	0 72	0 74	0 75	0 77	0 79	0 81	0 83	0 84	0 86	0 88	0 90	0 91	0 93	0 95
13	0 47	0 49	0.50	0 52	0 53	0 55	0 56	0 58	0.59	0 61	0 62	0 64	0 65	0 67	0.68	0 70	0 71	0 73	0 75
14	0 35	0 37	0 38	0 39	0 40	0 42	0 43	0 44	0 45	0 47	0 48	0 49	0 51	0 52	0 53	0 55	0 56	0 57	0 59
15	0 27	0 28	0 29	0 30	0 31	0 32	0 33	0 34	0 35	0 36	0 37	0 38	0 39	0 41	0 42	0 43	0 44	0 45	0 46
16	0 20	0 21	0 22	0 23	0 23	0 24	0 25	0 26	0 27	0 28	0 29	0 30	0 31	0 32	0 33	0 34	0 35	0 36	0 37
17	0 15	0 16	0 17	0 17	0 18	0 19	0 19	0 20	0 21	0 22	0 22	0.23	0 24	0 25	0 26	0 26	0 27	0 28	0 29
18+	0 48	0 51	0 54	0 57	0 60	0 63	0 66	0 70	0 73	0 77	0 81	0 85	0 89	0 93	0 97	1 01	1 06	1 10	. 15
DP 18+	20 71	20 73	20 76	20 80	20 83	20 87	20 90	20 94	20 98	21 02	21 05	21 09	21 12	21 16	21 19	21 22	21 26	21 29	2. 33

WEIGHT PERCENT X-MER VS DP
MW(FOH)= 144 00
PROBABILITIES ARE 0.17 0 23 0 16 0 44

DP	1 020	1 030	1 040	1 050	1 060	1 070	1 080	1 090	1 100	1 110	1 120	1 130	1 140	1 150	1 160	1 170	1 180	1 190	1 200
DP1/DP2	33 80222	90917	46414	19712	07010	465 9	300 8	394 7	669 7	077 6	583 6.166	5 809	5 499	5 229	4.990	4 778	4 589	4 419	
ALPHA	0 005	0 007	0 010	0 012	0 014	0 016	0.019	0.021	0.023	0 025	0.027	0 029	0.031	0 033	0.034	0.036	0.038	0 040	0 042
X-MER																			
1	97 02	95 60	94 21	92.86	91.54	90 26	89 01	87 79	86 61	85 45	84.32	83 22	82.15	81.10	80 07	79 07	78 10	77 14	76 21
2	2 87	4 17	5 39	6 54	7 62	8.62	9.57	10 46	11 29	12 07	12 81	13 50	14 14	14.75	15 31	15.85	16.34	16.81	17 25
3	0 10	0 22	0 37	0.55	0 75	0 98	1 22	1 48	1 75	2 02	2 31	2 60	2 89	3 18	3 47	3.76	4.05	4 34	4.63
4	0 00	0 01	0 03	0 05	0.08	0.12	0.17	0 23	0.29	0 37	0 45	0 54	0 63	0 74	0 85	0 96	1.08	1 21	1 34
5	0 00	0.00	0 00	0.00	0.01	0.02	0 02	0 04	0 05	0 07	0 09	0 12	0.15	0.18	0.22	0.26	0 30	0 35	0 40
6	0 00	0.00	0 00	0 00	0 00	0 00	0 00	0 01	0.01	0 01	0 02	0 03	0.03	0.04	0 06	0.07	0 09	0 10	0.12
7	0 00	0 00	0 00	0 00	0.00	0.00	0 00	0 00	0 00	0 00	0 00	0 01	0.01	0.01	0.01	0.02	0 02	0.03	0 04
8	0.00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0.00	0 00	0 01	0 01	0 01	0 01
9	0 00	0.00	0 00	0 00	0.00	0 00	0 00	0 00	0.00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0.00	0 00
10	0 00	0.00	0.00	0.00	0.00	0 00	0 00	0.00	0 00	0 00	0 00	0.00	0.00	0 00	0 00	0.00	0.00	0 00	0 00
11	0 00	0.00	0 00	0 00	0 00	0 00	0 00	0.00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00
12	0 00	0.00	0.00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0.00	0.00	0 00	0 00	0.00
13	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0.00	0 00	0 00	0 00	0 00	0 00
14	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00
15	0.00	0 00	0 00	0 00	0 00	0.00	0 00	0 00	0 00	0 00	0 00	0.00	0.00	0.00	0 00	0 00	0 00	0 00	0 00
16	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0.00	0.00	0 00	0 00	0 00	0 00	0 00
17	0.00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00
18+	0 00	0 00	0 00	0.00	0.00	0 00	0 00	0 00	0 00	0.00	0.00	0.00	0 00	0 00	0 00	0.00	0.00	0.00	0.00
DP 18+	18 00	18 00	18 00	18 00	18.00	18 00	18 00	18 00	18 00	18 00	18 00	18 00	18 00	18 00	18 00	18 00	18 00	18 00	18 00

WEIGHT PERCENT X-MER VS DP
MW(FOH)= 144 00
PROBABILITIES ARE 0 17 0.23 0 16 0 44

DP	1 210	1.220	1 230	1.240	1 250	1 260	1.270	1.280	1 290	1 300	1 310	1 320	1 330	1 340	1 350	1 360	1 370	1 380	1 390
DP1/DP2	4 265	4 125	3 997	3 881	3 773	3 674	3 583	3.498	3.419	3 345	3 277	3 212	3 152	3 095	3 042	2 991	2 944	2 899	2 856
ALPHA	0 043	0 045	0 047	0 048	0 050	0 052	0 053	0 055	0 056	0 058	0 059	0 061	0 062	0 063	0 065	0 066	0 068	0 069	0 070
X-MER																			
1	75 30	74 40	73 53	72 68	71.84	71.03	70.23	69 45	68 68	67 93	67.19	66 47	65.77	65.08	64.40	63 73	63 08	62 44	61 81
2	17 66	18 04	18 40	18 73	19 04	19 33	19 60	19 85	20 09	20 30	20 51	20 69	20.87	21 02	21 17	21 31	21 43	21 54	21 64
3	4 91	5 18	5 45	5 72	5.98	6 23	6 48	6.72	6 96	7 19	7.41	7.63	7 84	8 04	8 24	8 43	8 61	8 79	8 97
4	1 47	1 60	1 74	1 88	2.02	2 16	2 31	2 45	2 59	2 74	2.88	3 03	3 17	3 31	3.45	3 59	3 73	3 86	4 00
5	0 46	0 52	0 58	0 64	0 71	0 78	0 85	0 93	1 01	1 09	1 17	1 25	1 33	1 42	1 50	1 59	1 68	1 77	1 85
6	0 15	0.17	0.20	0.23	0.26	0 29	0 32	0 36	0 40	0.44	0 48	0 53	0 57	0 62	0 67	0 72	0 77	0 83	0 88
7	0.05	0 06	0 07	0.08	0.09	0.11	0.13	0 14	0.16	0.18	0.20	0 23	0 25	0.28	0.31	0.33	0.36	0.39	0 43
8	0 02	0 02	0 02	0 03	0 03	0.04	0 05	0 06	0 07	0 08	0 09	0 10	0 11	0 13	0 14	0 16	0 17	0 19	0 21
9	0 01	0 01	0 01	0 01	0 01	0 02	0.02	0 02	0 03	0 03	0 04	0 04	0 05	0 06	0 07	0 07	0 08	0 09	0 10
10	0 00	0.00	0 00	0.00	0 00	0 01	0 01	0 01	0.01	0 01	0 02	0.02	0 02	0.03	0 03	0 03	0 04	0 05	0.05
11	0.00	0 00	0.00	0.00	0.00	0 00	0 00	0 00	0.00	0 01	0 01	0 01	0 01	0 01	0 01	0.02	0.02	0 02	0 03
12	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 01	0 01	0 01	0.01	0 01	0 01
13	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 01	0 01
14	0.00	0.00	0.00	0.00	0.00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0.00	0.00	0.00	0.00	0.00	0 00
15	0.00	0 00	0.00	0 00	0 00	0 00	0.00	0.00	0.00	0.00	0 00	0 00	0 00	0.00	0.00	0.00	0 00	0 00	0 00
16	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0.00	0 00	0 00	0 00	0.00	0 00	0.00	0.00	0 00	0 00	0 00	0 00
17	0 00	0.00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00
18+	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0.00	0.00	0 00	0 00	0 00	0 00	0 00	0 00
DP 18+	18 00	18 00	18 00	18 00	18 00	18 00	18 00	18 00	18 00	18 00	18 00	18 00	18 00	18 00	18 00	18 00	18 00	18 00	18 00

WEIGHT PERCENT X-MER VS DP
MW(POH)= 144.00
PROBABILITIES ARE 0 17 0.23 0 16 0 44

DP	1 400	1 410	1 420	1.430	1 440	1 450	1.460	1 470	1 480	1.490	1.500	1 510	1 520	1 530	1 540	1 550	1.560	1 570	1 580
DP1/DP2	2.816	2 777	2 741	2 706	2.673	2 641	2 611	2 582	2 554	2.528	2 502	2.478	2 455	2 432	2 410	2 390	2 370	2.350	2.332
ALPHA	0 071	0.073	0.074	0 075	0 076	0 078	0 079	0 080	0.081	0 082	0 083	0 084	0.086	0 087	0 088	0.089	0 090	0 091	0.092
X-MER																			
1	61 20	60.59	60 00	59 42	58 85	58 29	57 74	57.20	56 67	56 14	55 63	55 13	54 63	54 14	53.67	53 20	52 73	52 28	51 83
2	21 74	21 82	21 89	21 96	22.02	22.07	22.12	22 15	22.19	22 21	22 23	22 25	22.26	22 26	22 26	22.26	22.25	22.24	22 23
3	9 13	9 29	9 45	9 60	9 74	9 88	10 02	10.15	10.27	10.39	10 50	10.61	10 72	10 82	10 92	11 01	11 10	11 18	11 26
4	4.13	4.26	4.39	4.52	4 64	4.76	4.88	5 00	5 12	5 23	5 34	5 45	5.55	5.66	5.76	5.86	5.95	6.05	6.14
5	1 94	2 03	2 12	2 21	2 30	2 39	2.48	2.56	2.65	2 74	2.83	2.91	3 00	3 08	3.16	3.24	3 32	3.40	3 48
6	0 94	0 99	1.05	1.11	1.17	1 23	1 29	1 35	1 41	1 47	1 53	1 59	1.66	1.72	1.78	1.84	1 90	1.96	2 03
7	0 46	0 49	0 53	0 57	0 60	0 64	0 68	0.72	0 76	0 80	0 84	0.89	0 93	0 97	1 02	1 06	1 11	1.15	1 20
8	0 23	0 25	0.27	0 29	0 32	0 34	0 36	0 39	0 42	0 44	0 47	0 50	0 53	0 56	0 59	0 62	0 65	0.68	0 72
9	0 11	0.13	0 14	0 15	0.17	0 18	0.20	0.21	0 23	0 25	0 27	0 28	0 30	0 32	0 34	0 37	0.39	0 41	0 43
10	0.06	0 06	0 07	0 08	0 09	0 10	0 11	0 12	0 13	0 14	0 15	0 16	0 18	0 19	0 20	0.22	0 23	0 25	0.26
11	0 03	0 03	0.04	0 04	0 05	0 05	0.06	0 06	0 07	0 08	0 09	0 09	0 10	0 11	0 12	0 13	0 14	0 15	0 16
12	0.01	0 02	0.02	0 02	0 03	0 03	0 03	0 04	0 04	0 04	0 05	0 05	0 06	0 07	0 07	0 08	0.08	0.09	0 10
13	0 01	0 01	0 01	0 01	0.01	0 02	0 02	0 02	0 02	0 03	0 03	0.03	0 04	0 04	0 04	0 05	0 05	0 06	0 06
14	0.00	0 00	0 01	0 01	0 01	0 01	0 01	0 01	0 01	0.01	0.02	0.02	0.02	0.02	0 03	0 03	0.03	0 03	0 04
15	0 00	0 00	0 00	0.00	0 00	0 00	0.01	0 01	0 01	0 01	0 01	0 01	0 01	0 01	0 02	0 02	0 02	0 02	0 02
16	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0.00	0.00	0 01	0.01	0.01	0.01	0 01	0 01	0 01	0.01	0 01
17	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0.01	0.01	0.01	0 01	0 01
18+	0.00	0 00	0 00	0.00	0 00	0 00	0 00	0.00	0 00	0.00	0 00	0.01	0 01	0 01	0 01	0 01	0.01	0 01	0 02
DP 18+	18 00	18 00	18 00	18.00	18.00	18.00	18 00	18 00	18.00	18.00	18 00	18 00	18 00	18 00	18 00	18 00	18 07	18 14	18 59

WEIGHT PERCENT X-MER VS DP
MW(POH)= 144.00
PROBABILITIES ARE 0 17 0 23 0 16 0 44

DP	1 590	1 600	1 610	1 620	1 630	1 640	1 650	1 660	1 670	1 680	1.690	1 700	1 710	1 720	1 730	1 740	1.750	1 760	1 770
DP1/DP2	2 314	2.297	2.280	2 264	2 248	2.233	2.219	2.205	2 191	2 178	2.165	2 152	2 140	2 129	2 117	2 106	2 095	2 085	2 075
ALPHA	0 093	0 094	0 095	0 096	0 097	0 098	0 098	0.099	0.100	0.101	0.102	0 103	0 104	0 105	0 105	0 106	0 107	0 108	0 109
X-MER																			
1	51 39	50 96	50 53	50 11	49.70	49.29	48.89	48.50	48 11	47 73	47 35	46 98	46 61	46 26	45 90	45 55	45 21	44.87	44 54
2	22 21	22 19	22 16	22 13	22 10	22 07	22 04	22 00	21 96	21 92	21.87	21 83	21 78	21.73	21.68	21.63	21 58	21 52	21.46
3	11 34	11 41	11 48	11 55	11.61	11 67	11 73	11 78	11.84	11.88	11 93	11 97	12 01	12 05	12 09	12 12	12 15	12 18	12 21
4	6 23	6 32	6 40	6.48	6 56	6 64	6 72	6 79	6 86	6 93	7 00	7 07	7.13	7 19	7 25	7 31	7.36	7 42	7 47
5	3 56	3 64	3 71	3 79	3 86	3 93	4 00	4.07	4 14	4.21	4.27	4 34	4.40	4 46	4 52	4 58	4 64	4 70	4.76
6	2.09	2 15	2.21	2 27	2 33	2 39	2 45	2 50	2 56	2 62	2.67	2.73	2.79	2.84	2.89	2 95	3.00	3 05	3 10
7	1 24	1 29	1 33	1.38	1.43	1 47	1 52	1.56	1 61	1 66	1 70	1 75	1 79	1 84	1 88	1 93	1 97	2 02	2 06
8	0 75	0.78	0 82	0 85	0 89	0 92	0 96	0 99	1 03	1 06	1 10	1.13	1 17	1.20	1.24	1.28	1 31	1.35	1 38
9	0.46	0.48	0.50	0.53	0.55	0 58	0.61	0 63	0 66	0 69	0.71	0.74	0 77	0 80	0.82	0 85	0.88	0.91	0.94
10	0 28	0 30	0 31	0 33	0 35	0 37	0 39	0.41	0.43	0.45	0.47	0.49	0 51	0.53	0.55	0 57	0 60	0 62	0 64
11	0.17	0.18	0.20	0.21	0 22	0 24	0 25	0 26	0 28	0 29	0 31	0 32	0 34	0.35	0.37	0.39	0.40	0 42	0 44
12	0 11	0 11	0 12	0 13	0 14	0.15	0 16	0.17	0.18	0 19	0 20	0 21	0 23	0 24	0 25	0 26	0 28	0 29	0 30
13	0.07	0 07	0 08	0 08	0 09	0 10	0.10	0 11	0 12	0 13	0 14	0 14	0.15	0.16	0 17	0.18	0 19	0 20	0 21
14	0 04	0 05	0 05	0 05	0.06	0 06	0 07	0.07	0.08	0.08	0.09	0.10	0.10	0.11	0 12	0 12	0 13	0 14	0 15
15	0 03	0.03	0 03	0 03	0 04	0 04	0.04	0.05	0 05	0 06	0 06	0 06	0.07	0 07	0 08	0.08	0 09	0.10	0 10
16	0 02	0 02	0 02	0 02	0 02	0 03	0.03	0 03	0.03	0.04	0.04	0 04	0 05	0.05	0 05	0 06	0 06	0 07	0 07
17	0.01	0.01	0.01	0.01	0 02	0 02	0 02	0.02	0 02	0.02	0.03	0.03	0.03	0.03	0 04	0.04	0 04	0 05	0 05
18+	0 02	0.02	0.02	0.03	0.03	0.03	0.04	0.04	0.05	0.05	0 06	0 06	0.07	0 08	0 08	0 09	0.10	0 11	0 12
DP 18+	18 55	18.56	18 84	18 89	18 80	19.07	19 22	19 24	19 31	19 44	19 51	19 60	19 61	19.63	19 75	19.74	19 81	19 85	19 93

WEIGHT PERCENT X-MER VS DP
MW(FCH)= 144 00
PROBABILITIES ARE 0 17 0 23 0 16 0 44

DP	1 780	1 790	1 800	1 810	1 820	1 830	1 840	1.850	1 860	1 870	1 880	1 890	1.900	1 910	1 920	1 930	1 940	1 950	1 960
DP1/DP2	2 065	2 055	2 046	2 037	2 028	2 019	2 011	2 003	1 995	1 987	1 979	1 972	1 965	1 958	1 951	1 944	1 937	1 931	1 925
ALPHA	0 110	0 110	0 111	0 112	0 113	0 113	0 114	0 115	0 116	0 116	0 117	0 118	0 118	0 119	0 120	0 120	0 121	0 122	0 122
X-MER																			
1	44 21	43 88	43 56	43 24	42 93	42 63	42 32	42.03	41 73	41 44	41 15	40 87	40 59	40 32	40 04	39 78	39 51	39 25	38 99
2	21 41	21 35	21 29	21 23	21 17	21 11	21 05	20 98	20 92	20 86	20.79	20 73	20.66	20 59	20 53	20 46	20 39	20 33	20 26
3	12 23	12 26	12 28	12 30	12 32	12 33	12 35	12 36	12 37	12 38	12 39	12 40	12 40	12 4	12 41	12 41	12 41	12 41	12 41
4	7 52	7 57	7 62	7 66	7 71	7 75	7.79	7 83	7 87	7 90	7 94	7 97	8 01	8 04	8 07	8 10	8 12	8 15	8 17
5	4 81	4.86	4 92	4 97	5 02	5 07	5 11	5 16	5 21	5 25	5 29	5 34	5 38	5 42	5.46	5 49	5 53	5 57	5 60
6	3 15	3.20	3 25	3 30	3 35	3 40	3 44	3 49	3 53	3 58	3 62	3 66	3 70	3 74	3 78	3 82	3 86	3 90	3 94
7	2 10	2 15	2 19	2 23	2 27	2 31	2 36	2.40	2 44	2 48	2 52	2 55	2 59	2 63	2 67	2 70	2.74	2 78	2 81
8	1 42	1 46	1 49	1 53	1.56	1 60	1 63	1 67	1.70	1 74	1 77	1.80	1 84	1 87	1 90	1 94	1 97	2 00	2 03
9	0 97	1 00	1 02	1 05	1 08	1.11	1 14	1 17	1 20	1 23	1 26	1 29	1 32	1 34	1 37	1 40	1.43	1 46	1.48
10	0 66	0 69	0 71	0 73	0 76	0 78	0 80	0.83	0 85	0 87	0 90	0 92	0 95	0 97	0 99	1 02	1 04	1 07	1.09
11	0 46	0 48	0 49	0 51	0 53	0 55	0 57	0 59	0 61	0 63	0 65	0 67	0 69	0 71	0 73	0 75	0 77	0 79	0 81
12	0 32	0 33	0 35	0 36	0 37	0.39	0 40	0 42	0 44	0 45	0 47	0 48	0 50	0 52	0 53	0 55	0 56	0 58	0 60
13	0 22	0 23	0 24	0 25	0 27	0 28	0 29	0 30	0 31	0 33	0 34	0 35	0 36	0 38	0 39	0 40	0 42	0 43	0 45
14	0 15	0 16	0 17	0 18	0 19	0 20	0 21	0 22	0 23	0 24	0 25	0 26	0 27	0 28	0 29	0 30	0 31	0 32	0 33
15	0 11	0 11	0 12	0 13	0 13	0 14	0 15	0 16	0 16	0 17	0 18	0 19	0 20	0 20	0 21	0 22	0 23	0 24	0 25
16	0 08	0 08	0 09	0 09	0 10	0 10	0 11	0.11	0 12	0 13	0 13	0 14	0 14	0 15	0 16	0 17	0 17	0 18	0 19
17	0 05	0 06	0 06	0 06	0 07	0 07	0 08	0 08	0 09	0 09	0 10	0 10	0 11	0 11	0 12	0 12	0 13	0 14	0 14
18+	0 13	0 14	0 15	0 16	0 18	0 19	0 20	0 22	0 24	0 25	0 27	0 29	0 31	0 33	0 35	0 37	0 40	0 42	0 44
DP 18+	19 99	20 01	20 05	20 11	20 15	20 18	20 20	20 23	20 30	20 33	20 37	20 41	20 46	20 47	20 52	20 55	20 58	20 64	20 67

WEIGHT PERCENT X-MER VS DP
MW(FCH)= 144 00
PROBABILITIES ARE 0 17 0 23 0 16 0 44

DP	1 970	1 980	1 990	2 000	2 010	2 020	2.030	2 040	2 050	2 060	2 070	2 080	2 090	2 100	2 110	2 120	2 130	2 140	2 150
DP1/DP2	1 919	1 913	1 907	1 901	1 895	1 890	1 884	879	1 874	1 869	1 864	1 859	1 854	1 850	1 845	1 841	1 836	1 832	1 828
ALPHA	0 123	0 124	0 124	0 125	0 126	0 126	0 127	0.127	0.128	0 129	0 129	0.130	0 130	0 131	0 132	0 132	0 133	0 133	0 134
X-MER																			
1	38 74	38 48	38 23	37.99	37.75	37 51	37 27	37 04	36 81	36 58	36 35	36 13	35 91	35 69	35 48	35 27	35 06	34 85	34 64
2	20 19	20 12	20 05	19 99	19.92	19.85	19 78	19 71	19 64	19 57	19 50	19.43	19.37	19.30	19.23	19 16	19 09	19 02	18 95
3	12 41	12 40	12 40	12 39	12 39	12 38	12 37	12 36	12 35	12 34	12 33	12 32	12 30	12 29	12.28	12 26	12 25	12 23	12 22
4	8 20	8 22	8 24	8 26	8.28	8 30	8 32	8 34	8 35	8.37	8.38	8 39	8 41	8 42	8 43	8 44	8 45	8 46	8 47
5	5 64	5 67	5 70	5 73	5.76	5.79	5.82	5 85	5 88	5 90	5 93	5 95	5 98	6 00	6 02	6 04	6 06	6 08	6 10
6	3.97	4 01	4 04	4 08	4 11	4 14	4 18	4 21	4 24	4 27	4 30	4 33	4 35	4.38	4.41	4.44	4 46	4 49	4 51
7	2 85	2 88	2 92	2 95	2 98	3 01	3 05	3 08	3.11	3 14	3 17	3 20	3 23	3 25	3 28	3 31	3 34	3 36	3 39
8	2 07	2 10	2 13	2 16	2 19	2 22	2 25	2 28	2 31	2 34	2 36	2 39	2 42	2 45	2 47	2 50	2 53	2 55	2 58
9	1 51	1 54	1.57	1 59	1 62	1 65	1 68	1 70	1 73	1 75	1 78	1 81	1 83	1 86	1 88	1 91	1 93	1 95	1 98
10	1 11	1 14	1 16	1 19	1 21	1 23	1 26	1.28	1 30	1 33	1 35	1 37	1 40	1 42	1 44	1 46	1 49	1 51	1 53
11	0 83	0 85	0 87	0 89	0 91	0 93	0 95	0 97	0 99	1 01	1 03	1 05	1 07	1 09	1 11	1 13	1 15	1 17	1 19
12	0.62	0 63	0 65	0 67	0 68	0 70	0 72	0 74	0 75	0 77	0 79	0 81	0 82	0 84	0 86	0 88	0 89	0 91	0 93
13	0 46	0 47	0.49	0 50	0.52	0 53	0 55	0 56	0.58	0 59	0 61	0 62	0.64	0.65	0.67	0 68	0.70	0 71	0 73
14	0 35	0 36	0 37	0 38	0 39	0 41	0 42	0 43	0 44	0 46	0 47	0 48	0 49	0 51	0 52	0 53	0 55	0 56	0 57
15	0 26	0 27	0 28	0 29	0 30	0 31	0 32	0 33	0 34	0 35	0 36	0 37	0 38	0 40	0 41	0 42	0 43	0 44	0 45
16	0 20	0 20	0 21	0 22	0 23	0 24	0 25	0 25	0 26	0 27	0 28	0 29	0 30	0 31	0 32	0 33	0 34	0 35	0 36
17	0 15	0 15	0 16	0 17	0 17	0.18	0 19	0 20	0 20	0.21	0 22	0 23	0 23	0.24	0.25	0 26	0 27	0 27	0 28
18+	0 47	0 50	0 53	0 55	0 58	0 62	0 65	0 68	0 72	0 75	0 79	0.82	0.86	0 90	0 94	0 99	1 03	1 07	1 12
DP 18+	20 71	20 73	20 76	20 80	20 83	20 87	20 90	20 94	20 98	21 02	21 05	21 09	21 12	21 16	21 19	21 22	21 26	21 29	21 33

WEIGHT PERCENT X-MER VS DP
MW(FOH)= 158.00
PROBABILITIES ARE 0 17 0.23 0 16 0 44

DP	1 020	1 030	1 040	1 050	1 060	1 070	1.080	1.090	1 100	1.110	1.120	1 130	1 140	1 150	1.160	1.170	1 180	1 190	1 200
DP1/DP234	32223	26117	73214	41512	20510	626	9.443	8.523	7.787	7.186	6 685	6 261	5.898	5.584	5 309	5.067	4 852	4 660	4 487
ALPHA	0 005	0 007	0 010	0 012	0.014	0 016	0 019	0 021	0 023	0 025	0.027	0 029	0 031	0 033	0 034	0.036	0.038	0.040	0 042
X-MER																			
1	97.07	95 66	94.29	92 96	91 67	90 40	89 17	87 97	86 80	85 66	84 54	83.46	82 40	81 36	80.35	79 36	78 40	77.45	76 53
2	2 83	4.11	5.32	6 45	7 51	8 51	9 44	10 32	11 15	11 92	12.65	13 33	13 97	14.57	15 13	15.66	16 16	16 62	17 06
3	0 10	0 21	0.36	0.54	0.74	0 96	1.20	1.45	1 71	1 98	2 26	2 54	2 83	3 12	3 41	3.69	3 98	4 26	4 54
4	0 00	0 01	0 03	0 05	0 08	0 12	0 16	0 22	0 28	0 36	0 44	0 52	0.62	0.72	0.83	0.94	1 06	1 18	1 31
5	0 00	0 00	0.00	0 00	0 01	0 01	0 02	0 03	0 05	0.07	0 09	0 11	0 14	0 17	0 21	0 25	0 29	0 34	0 39
6	0.00	0.00	0.00	0 00	0.00	0.00	0 00	0.01	0.01	0 01	0 02	0 02	0 03	0.04	0.05	0 07	0.08	0 10	0 12
7	0 00	0 00	0 00	0 00	0.00	0.00	0.00	0 00	0.00	0 00	0 00	0 01	0 01	0 01	0 01	0 02	0 02	0 03	0 04
8	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 01	0.01	0 01	0 01
9	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0.00	0.00	0.00	0.00	0 00	0 00
10	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0.00	0 00	0 00	0.00	0.00	0.00	0 00	0 00	0 00
11	0 00	0 00	0.00	0.00	0.00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0.00	0.00	0 00	0 00	0 00
12	0 00	0 00	0 00	0 00	0.00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00
13	0 00	0.00	0 00	0 00	0.00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0.00	0 00	0 00
14	0.00	0.00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00
15	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0.00	0.00	0 00	0.00
16	0 00	0 00	0.00	0 00	0 00	0 00	0 00	0 00	0.00	0 00	0 00	0 00	0.00	0 00	0 00	0 00	0.00	0 00	0.00
17	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0.00	0.00	0.00	0 00	0 00	0 00	0.00	0.00	0.00	0 00	0.00
18+	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0.00	0.00	0.00	0.00	0.00	0.00	0 00	0 00	0 00	0 00
DP 18+	18 00	18.00	18 00	18 00	18 00	18 00	18 00	18 00	18 00	18.00	18.00	18 00	18 00	18.00	18.00	18 00	18 00	18 00	18.00

WEIGHT PERCENT X-MER VS DP
MW(FOH)= 158 00
PROBABILITIES ARE 0 17 0 23 0 16 0 44

DP	1 210	1 220	1 230	1 240	1.250	1 260	1 270	1 280	1 290	1 300	1 310	1 320	1 330	1.340	1 350	1 360	1.370	1.380	1.390
DP1/DP2	4.330	4 188	4.059	3 940	3 831	3 731	3 638	3 552	3 472	3 397	3 327	3 262	3 200	3 143	3 089	3.037	2.989	2 943	2 900
ALPHA	0 043	0.045	0.047	0 048	0.050	0 052	0 053	0 055	0 056	0 058	0 059	0 061	0 062	0 063	0 065	0 066	0 068	0 069	0 070
X-MER																			
1	75 63	74 75	73 88	73 04	72.21	71 41	70.61	69.84	69.08	68.34	67 61	66 90	66.20	65 51	64.84	64 18	63 54	62 90	62 28
2	17 47	17 85	18 20	18 54	18 85	19.14	19.41	19 66	19 90	20 12	20 32	20 51	20 68	20 85	20 99	21 13	21 26	21 37	21 48
3	4 82	5 09	5.36	5.62	5.87	6 12	6.37	6 61	6.84	7 07	7 29	7 50	7 71	7 91	8 11	8 30	8 48	8.66	8 83
4	1 43	1 57	1.70	1.84	1 98	2 12	2 26	2 40	2 54	2.68	2 82	2 96	3 10	3 24	3 38	3 52	3 65	3 79	3 92
5	0 45	0 50	0 56	0 63	0 69	0 76	0.83	0 91	0.98	1.06	1 14	1 22	1 30	1 38	1 47	1 55	1 64	1 73	1 81
6	0 14	0 17	0.19	0 22	0 25	0.28	0 32	0 35	0 39	0.43	0.47	0.51	0 56	0.61	0.65	0.70	0 76	0 81	0 86
7	0 05	0 06	0 07	0 08	0 09	0 11	0.12	0 14	0 16	0.18	0.20	0 22	0.25	0.27	0.30	0.32	0 35	0 38	0 42
8	0 02	0 02	0 02	0 03	0 03	0 04	0 05	0 06	0 06	0 07	0.08	0.10	0.11	0.12	0.14	0.15	0.17	0 19	0 20
9	0 00	0.01	0 01	0 01	0 01	0 02	0 02	0 02	0 03	0 03	0 04	0.04	0 05	0.06	0 06	0 07	0 08	0.09	0.10
10	0 00	0 00	0.00	0.00	0 00	0 01	0.01	0 01	0 01	0 01	0 02	0 02	0 02	0.03	0.03	0 03	0 04	0 04	0 05
11	0 00	0.00	0.00	0 00	0.00	0 00	0 00	0 00	0 00	0 01	0 01	0 01	0 01	0 01	0 01	0 02	0 02	0 02	0 02
12	0 00	0.00	0.00	0 00	0 00	0 00	0 00	0.00	0 00	0.00	0.00	0.00	0 00	0.01	0 01	0 01	0 01	0 01	0 01
13	0 00	0.00	0.00	0 00	0 00	0.00	0 00	0.00	0 00	0 00	0 00	0 00	0.00	0 00	0.00	0.00	0 00	0 01	0 01
14	0 00	0 00	0 00	0 00	0 00	0.00	0.00	0 00	0 00	0.00	0.00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00
15	0 00	0 00	0 00	0 00	0.00	0.00	0 00	0 00	0 00	0.00	0.00	0.00	0.00	0.00	0.00	0 00	0.00	0 00	0.00
16	0.00	0 00	0 00	0 00	0.00	0 00	0 00	0 00	0 00	0 00	0.00	0.00	0 00	0 00	0 00	0.00	0.00	0.00	0.00
17	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0.00	0.00	0 00	0.00	0 00	0.00	0 00
18+	0 00	0 00	0 00	0 00	0.00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0.00	0 00	0 00	0 00	0 00	0 00	0 00
DP 18+	18.00	18.00	18 00	18 00	18 00	18 00	18 00	18 00	18 00	18 00	18.00	18 00	18.00	18 00	18.00	18 00	18 00	18.00	18.00

WEIGHT PERCENT X-MER VS DP
MW(FOH)= 158.00
PROBABILITIES ARE 0 17 0 23 0 16 0 44

DP	1 400	1 410	1.420	1 430	1 440	1 450	1 460	1 470	1 480	1 490	1 500	1 510	1 520	1 530	1 540	1.550	1 560	1.570	1.580
DP1/DP2	2 859	2 820	2 783	2 747	2 714	2 682	2 651	2 621	2 593	2 567	2 541	2 516	2 492	2 469	2 448	2 426	2 406	2.387	2 368
ALPHA	0 071	0 073	0 074	0 075	0 076	0 078	0 079	0 080	0 081	0 082	0 083	0 084	0.086	0 087	0 088	0 089	0 090	0.091	0.092
X-MER																			
1	61 67	61.07	60.48	59 91	59.34	58 78	58.24	57 70	57 17	56 65	56 14	55.64	55 15	54 67	54 19	53.73	53.27	52.81	52 37
2	21 57	21 65	21 74	21 80	21 87	21 92	21.97	22.01	22 05	22.07	22 10	22.12	22.13	22 14	22 14	22 14	22 14	22 13	22 12
3	9.00	9 16	9.31	9 46	9.60	9 74	9.88	10 01	10 13	10 25	10 36	10.47	10 58	10 68	10.78	10.87	10.96	11 04	11 12
4	4 05	4 18	4.31	4 43	4 55	4 67	4.79	4 91	5 02	5.14	5.24	5 35	5.46	5.56	5 66	5 76	5.85	5.95	6.04
5	1 90	1 99	2.08	2 16	2 25	2 34	2 42	2 51	2.60	2 68	2 77	2.85	2.93	3.02	3.10	3.18	3 26	3.34	3 41
6	0 91	0 97	1 03	1 08	1 14	1 20	1 26	1 32	1 38	1 44	1 50	1 56	1.62	1 68	1 74	1 80	1 86	1 92	1 98
7	0.45	0 48	0 52	0 55	0 59	0 63	0 66	0 70	0 74	0 78	0 82	0 87	0 91	0 95	0 99	1 04	1 08	1 13	1 17
8	0.22	0 24	0.26	0 28	0.31	0 33	0 36	0.38	0 41	0 43	0 46	0 49	0.52	0.55	0 58	0 61	0 64	0 67	0 70
9	0 11	0 12	0 14	0.15	0 16	0 18	0 19	0 21	0 22	0 24	0 26	0 28	0 30	0 32	0 34	0 36	0.38	0 40	0 42
10	0.06	0.06	0.07	0 08	0 09	0 09	0 10	0 11	0 12	0 14	0.15	0 16	0 17	0 18	0.20	0.21	0 23	0 24	0 26
11	0 03	0 03	0 04	0 04	0 05	0 05	0 06	0 06	0 07	0 08	0.08	0.09	0 10	0 11	0.12	0 13	0.14	0 15	0 16
12	0 01	0 02	0 02	0 02	0.02	0 03	0 03	0 03	0 04	0 04	0 05	0 05	0 06	0 06	0 07	0 08	0.08	0.09	0 10
13	0 01	0 01	0 01	0 01	0 01	0 02	0 02	0 02	0.02	0 02	0.03	0 03	0 03	0.04	0.04	0.05	0.05	0.05	0.06
14	0 00	0 00	0 01	0 01	0 01	0 01	0 01	0 01	0 01	0 01	0 02	0 02	0 02	0 02	0 02	0 03	0 03	0 03	0 04
15	0 00	0 00	0 00	0 00	0.00	0 00	0 01	0 01	0 01	0 01	0.01	0 01	0 01	0.01	0.01	0.02	0.02	0.02	0.02
16	0 00	0 00	0 00	0 00	0 00	0 00	0.00	0 00	0 00	0 00	0.01	0.01	0 01	0 01	0 01	0.01	0 01	0 01	0 01
17	0 00	0.00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0.01	0 01	0.01	0 01	0 01
18+	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0.00	0.00	0.00	0.01	0 01	0 01	0 01	0 01	0 01	0.01	0 01
DP 18+	18.00	18.00	18.00	18.00	18 00	18 00	18 00	18 00	18 00	18 00	18 00	18 00	18 00	18 00	18 00	18 00	18 02	18 14	18 59

WEIGHT PERCENT X-MER VS DP
MW(FOH)= 158 00
PROBABILITIES ARE 0 17 0 23 0 16 0 44

DP	1 590	1 600	1.610	1 620	1 630	1 640	1.650	1 660	1 670	1 680	1 690	1 700	1 710	1 720	1 730	1 740	1 750	1.760	1 770
DP1/DP2	2 350	2 332	2.315	2 299	2.283	2.268	2.253	2 238	2.225	2.211	2 198	2 185	2.173	2 161	2 150	2 138	2 128	2 117	2 107
ALPHA	0 093	0 094	0 095	0 096	0 097	0 098	0 098	0.099	0.100	0.101	0 102	0 103	0 104	0 105	0 105	0 106	0 107	0 108	0 109
X-MER																			
1	51 93	51.50	51 07	50 66	50 25	49 84	49 44	49 05	48.67	48.29	47.91	47 54	47 18	46 82	46.47	46.12	45.78	45 44	45 11
2	22.10	22.08	22 06	22 04	22.01	21.98	21.95	21.91	21 88	21 84	21 80	21 75	21 71	21 66	21 62	21 57	21 52	21 46	21 41
3	11.20	11 27	11 35	11 41	11 48	11 54	11.60	11.65	11.70	11.75	11 80	11 84	11.89	11.93	11.96	12.00	12.03	12 06	12 09
4	6 13	6 21	6.30	6.38	6 46	6 54	6.61	6 68	6 76	6 83	6 89	6 96	7 02	7 08	7 14	7.20	7 26	7 31	7 36
5	3 49	3 57	3 64	3 72	3 79	3 86	3 93	4 00	4.06	4 13	4 20	4 26	4 32	4 38	4 44	4 50	4.56	4 62	4 67
6	2.04	2 10	2.16	2 22	2 28	2 34	2 39	2 45	2 51	2 56	2 62	2 68	2 73	2.78	2.84	2 89	2.94	2 99	3.04
7	1 21	1 26	1 30	1 35	1 39	1 44	1.49	1 53	1.58	1.62	1.67	1 71	1 75	1.80	1 84	1.89	1 93	1 97	2 02
8	0 73	0 76	0.80	0.83	0 86	0 90	0 93	0 97	1 00	1 04	1 07	1 11	1 14	1 18	1 21	1 25	1 28	1 32	1 35
9	0.44	0.47	0.49	0 52	0 54	0 57	0 59	0 62	0 64	0 67	0 70	0 72	0 75	0.78	0.80	0.83	0.86	0 89	0 92
10	0 27	0 29	0 31	0 32	0 34	0 36	0 38	0 40	0.42	0 44	0.46	0 48	0 50	0 52	0 54	0 56	0 58	0 60	0 63
11	0.17	0 18	0.19	0 20	0 22	0 23	0 24	0 26	0 27	0 28	0 30	0 31	0 33	0.35	0 36	0 38	0 39	0.41	0.43
12	0 10	0 11	0.12	0.13	0.14	0.15	0 16	0.17	0.18	0 19	0.20	0.21	0.22	0.23	0.24	0 26	0.27	0.28	0 30
13	0.06	0.07	0 08	0 08	0 09	0 09	0 10	0 11	0 12	0 12	0 13	0 14	0 15	0.16	0 17	0 18	0.18	0 19	0 20
14	0 04	0 04	0 05	0 05	0 06	0 06	0 07	0 07	0 08	0 08	0 09	0 09	0 10	0 11	0.11	0 12	0 13	0 13	0 14
15	0 03	0 03	0 03	0 03	0 04	0 04	0 04	0 05	0 05	0 05	0 06	0 06	0 07	0 07	0.08	0 08	0.09	0 09	0 10
16	0 02	0 02	0 02	0 02	0 02	0 03	0 03	0 03	0 03	0 04	0 04	0 04	0.05	0 05	0.05	0.06	0 06	0.06	0 07
17	0.01	0 01	0 01	0 01	0 02	0.02	0.02	0.02	0 02	0 02	0 03	0 03	0 03	0 03	0.04	0 04	0 04	0 05	0 05
18+	0 02	0 02	0 02	0 03	0 03	0 03	0.04	0.04	0 04	0 05	0.05	0 06	0 07	0 07	0.08	0 09	0 10	0 11	0 11
DP 18+	18 55	18 56	18.84	18 89	18 80	19.07	19.22	19.24	19.31	19 44	19 51	19 60	19 61	19 63	19 75	19 74	19 81	19 85	19 93

WEIGHT PERCENT X-MER VS DP
MW(EOH)= 158 00
PROBABILITIES ARE 0 17 0 23 0 16 0 44

DP	1 780	1 790	1 800	1 810	1 820	1 830	1 840	1.850	1 860	1 870	1 880	1 890	1 900	1 910	1 920	1 930	1 940	1 950	1 960
DP1/DP2	2 097	2 087	2 077	2.068	2 059	2 050	2 042	2 034	2 025	2 018	2 010	2 002	1 995	1 988	1 981	1 974	1 967	1 961	1 954
ALPHA	0 110	0 110	0.111	0 112	0 113	0 113	0 114	0 115	0 116	0 116	0 117	0 118	0 118	0 119	0 120	0 120	0 121	0 122	0 122
X-MER																			
1	44 78	44 45	44 13	43 82	43 51	43 20	42 90	42 60	42 31	42 02	41 73	41 45	4. 17	40 90	40 63	40 36	40 09	39 83	39 57
2	21 36	21 30	21 25	21 19	21 13	21 07	21 01	20 95	20 89	20 83	20 76	20 70	20 64	20 57	20 51	20 45	20 38	20 32	20 25
3	12 11	12 14	12 16	12 18	12 20	12 22	12 23	12 25	12 26	12 27	12 28	12 29	12 30	12 30	12 31	12 31	12 31	12 31	12 31
4	7 41	7 46	7 51	7 56	7 60	7 64	7 68	7 72	7 76	7 80	7 84	7.87	7 90	7 93	7 96	7 99	8 02	8 05	8.07
5	4 73	4 78	4 83	4 88	4 93	4 98	5 03	5 08	5 12	5 17	5 21	5 25	5 29	5.33	5 37	5 41	5 45	5 48	5 52
6	3 09	3 14	3 19	3 24	3 29	3 33	3 38	3 42	3 47	3 51	3 55	3 60	3 64	3 68	3 72	3 76	3 79	3 83	3 87
7	2 06	2 10	2 14	2 19	2 23	2 27	2 31	2 35	2 39	2 43	2 47	2 50	2 54	2 58	2 62	2 65	2 69	2 72	2 76
8	1 39	1 42	1 46	1 49	1 53	1 56	1 60	1 63	1 67	1 70	1 73	1 77	1 80	1 83	1 86	1 90	1 93	1 96	1 99
9	0 94	0 97	1 00	1 03	1 06	1 09	1 12	1 14	1.17	1 20	1.23	1 26	1 29	1 31	1 34	1 37	1 40	1 43	1 45
10	0.65	0.67	0.69	0 72	0.74	0 76	0 78	0 81	0 83	0 85	0 88	0 90	0 93	0 95	0 97	1 00	1 02	1 04	1 07
11	0 45	0 46	0 48	0 50	0.52	0 54	0 56	0 57	0 59	0 61	0 63	0 65	0.67	0 69	0 71	0 73	0 75	0 77	0 79
12	0 31	0 32	0 34	0 35	0 37	0 38	0 39	0 41	0 42	0 44	0 46	0 47	0 49	0 50	0 52	0 54	0 55	0 57	0 58
13	0 21	0 23	0 24	0 25	0 26	0 27	0 28	0 29	0 31	0 32	0 33	0 34	0 36	0 37	0 38	0 40	0 41	0 42	0 44
14	0 15	0 16	0 17	0 17	0 18	0 19	0 20	0 21	0 22	0 23	0 24	0 25	0 26	0 27	0 28	0 29	0 30	0 31	0 33
15	0 10	0 11	0 12	0 12	0 13	0 14	0 14	0 15	0 16	0 17	0 18	0 18	0 19	0 20	0 21	0 22	0 23	0 24	0 24
16	0 07	0 08	0 08	0 09	0 09	0 10	0 10	0 11	0 12	0 12	0 13	0 13	0 14	0 15	0 15	0 16	0 17	0 18	0 18
17	0 05	0 06	0 06	0 06	0 07	0 07	0 08	0 08	0 08	0 09	0 09	0 10	0 10	0 11	0 11	0 12	0 13	0 13	0 14
18+	0 12	0 14	0.15	0 16	0 17	0 18	0 20	0 21	0 23	0 25	0 26	0 28	0 30	0 32	0 34	0 36	0 39	0 41	0 43
DP 18+	19 99	20.01	20 05	20.11	20 15	20 18	20 20	20 23	20 30	20 33	20 37	20 41	20 46	20 47	20 52	20 55	20 58	20 64	20 67

WEIGHT PERCENT X-MER VS DP
MW(EOH)= 158 00
PROBABILITIES ARE 0 17 0 23 0 16 0 44

DP	1 970	1 980	1 990	2 000	2.010	2 020	2 030	2 040	2 050	2 060	2 070	2 080	2 090	2 100	2 110	2 120	2.130	2.140	2 150
DP1/DP2	1 948	1 942	1 936	1 930	1 924	1 919	1 913	1 908	1 903	1 898	1 893	1 888	1 883	1 878	1 873	1 869	1 864	1 860	1 856
ALPHA	0.123	0 124	0 124	0 125	0 126	0 126	0 127	0 127	0 128	0 129	0 129	0 130	0 130	0 131	0 132	0 132	0 133	0 133	0 134
X-MER																			
1	39 32	39 07	38 82	38 57	38 33	38 09	37 86	37 62	37 39	37 16	36 94	36 71	36 49	36 28	36 06	35 85	35 64	35 43	35 23
2	20 18	20 12	20.05	19 99	19 92	19 85	19.78	19 72	19 65	19 58	19 52	19 45	19 38	19 32	19 25	19 18	19 12	19 05	18 98
3	12 31	12 31	12 30	12 30	12 29	12 29	12 28	12 27	12 26	12 26	12 25	12 23	12 22	12 21	12 20	12 19	12 17	12 16	12 14
4	8 10	8 12	8 14	8 17	8 19	8.21	8 22	8 24	8 26	8 27	8 29	8 30	8 31	8 33	8 34	8 35	8 36	8 37	8 38
5	5 55	5 59	5 62	5 65	5 68	5 71	5 74	5.77	5 79	5 82	5 84	5 87	5 89	5.92	5 94	5 96	5 98	6 00	6 02
6	3 90	3 94	3 97	4 01	4 04	4 07	4 11	4 14	4 17	4 20	4 23	4 26	4 29	4 31	4 34	4 37	4 39	4 42	4 44
7	2 79	2 83	2 86	2 89	2 93	2 96	2 99	3 02	3 05	3 08	3 11	3 14	3 17	3 20	3 23	3 25	3 28	3 31	3 33
8	2 02	2 06	2 09	2 12	2 15	2 18	2 21	2 23	2 26	2 29	2 32	2 35	2 37	2 40	2 43	2 45	2 48	2 51	2 53
9	1 48	1 51	1 53	1 56	1 59	1 61	1 64	1 67	1 69	1 72	1 74	1 77	1 80	1 82	1 84	1 87	1 89	1 92	1 94
10	1 09	1 11	1 14	1 16	1 18	1 21	1 23	1 25	1 28	1 30	1 32	1 34	1 37	1 39	1 41	1 43	1 46	1 48	1 50
11	0 81	0 83	0 85	0 87	0 89	0 91	0 93	0 95	0 97	0 99	1 01	1 03	1 05	1 07	1 09	1 11	1 13	1 15	1 16
12	0 60	0 62	0 64	0 65	0 67	0 69	0 70	0 72	0 74	0 75	0 77	0 79	0 81	0 82	0 84	0 86	0 87	0 89	0 91
13	0 45	0 46	0 48	0 49	0 51	0 52	0 53	0 55	0 56	0 58	0 59	0 61	0 62	0 64	0 65	0 67	0 68	0 70	0 71
14	0 34	0 35	0.36	0.37	0.38	0 40	0 41	0.42	0 43	0 45	0 46	0 47	0 48	0 50	0 51	0 52	0 53	0 55	0 56
15	0 25	0 26	0 27	0 28	0 29	0 30	0 31	0 32	0 33	0 34	0 35	0 36	0 38	0 39	0 40	0 41	0 42	0 43	0 44
16	0 19	0 20	0 21	0.21	0 22	0 23	0 24	0 25	0 26	0 27	0 27	0 28	0 29	0 30	0 31	0 32	0.33	0.34	0 35
17	0.14	0 15	0 16	0.16	0 17	0 18	0 18	0 19	0 20	0 21	0 21	0 22	0 23	0 24	0 24	0 25	0 26	0 27	0 28
18+	0 46	0 48	0 51	0 54	0 57	0 60	0 63	0 66	0 70	0 73	0 77	0 80	0 84	0 88	0 92	0 96	1 00	1 05	1 09
DP 18+	20 71	20 73	20 76	20 80	20.83	20 87	20 90	20 94	20 98	21 02	21 05	21 09	21 12	21 16	21 19	21 22	21 26	21 29	21 33

WEIGHT PERCENT X-MER VS DP
MW(POH)= 172 00
PROBABILITIES ARE 0 17 0 23 0 16 0 44

DP	1 020	1 030	1 040	1 050	1 060	1.070	1 080	1.090	1 100	1.110	1 120	1 130	1 140	1 150	1.160	1 170	1 180	1 190	1 200
DP1/DP234	81223.59	417 98	514 62	112 37	910 778	9 578	8.644	7.898	7.288	6 780	6 350	5 982	5.664	5 385	5 139	4 921	4 726	4 551	
ALPHA	0 005	0 007	0 010	0 012	0 014	0 016	0 019	0.021	0 023	0.025	0 027	0 029	0 031	0 033	0 034	0 036	0 038	0 040	0 042
X-MER																			
1	97 11	95.72	94.37	93.06	91.78	90.53	89 32	88 13	86 97	85 85	84 75	83 67	82 62	81 60	80 60	79 62	78 67	77 74	76 83
2	2.79	4 06	5 25	6.36	7.41	8 40	9 33	10 19	11.01	11 78	12 50	13 18	13 81	14 41	14 97	15 49	15 99	16 45	16 88
3	0.10	0.21	0 35	0 52	0.72	0 94	1 17	1 42	1 68	1 95	2 22	2.50	2 78	3 06	3 34	3 63	3 91	4 19	4 46
4	0 00	0.01	0 03	0 05	0 08	0 11	0 16	0 21	0 28	0 35	0 43	0 51	0 61	0.70	0 81	0 92	1 03	1 15	1 28
5	0 00	0 00	0 00	0.00	0 01	0 01	0 02	0.03	0 05	0 07	0 09	0 11	0 14	0.17	0.20	0.24	0.29	0 33	0 38
6	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 01	0 01	0 01	0 02	0 02	0 03	0 04	0 05	0 07	0 08	0.10	0 12
7	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0.00	0 00	0 00	0 00	0 01	0 01	0 01	0 01	0 02	0 02	0.03	0 04
8	0 00	0.00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 01	0 01	0.01	0 01
9	0 00	0.00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0.00	0 00	0.00	0 00	0 00	0.00	0 00	0 00	0 00	0.00
10	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0.00	0 00	0 00	0 00	0.00	0 00	0.00	0.00	0 00	0 00
11	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0.00	0 00	0 00	0 00	0 00	0 00	0 00	0.00	0 00	0 00
12	0 00	0 00	0.00	0 00	0.00	0.00	0 00	0 00	0 00	0.00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00
13	0 00	0 00	0 00	0 00	0.00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0.00	0 00	0.00	0 00	0 00	0 00
14	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00
15	0.00	0 00	0 00	0 00	0.00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00
16	0.00	0.00	0 00	0.00	0.00	0.00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00
17	0.00	0 00	0 00	0.00	0.00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00
18+	0.00	0.00	0 00	0.00	0.00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0.00	0 00	0 00
DP 18+	18.00	18.00	18 00	18 00	18 00	18 00	18 00	18 00	18 00	18 00	18 00	18 00	18 00	18 00	18 00	18 00	18 00	18 00	18 00

WEIGHT PERCENT X-MER VS DP
MW(POH)= 172 00
PROBABILITIES ARE 0 17 0 23 0 16 0 44

DP	1 210	1 220	1 230	1 240	1 250	1 260	1 270	1 280	1 290	1.300	1 310	1.320	1 330	1.340	1.350	1 360	1 370	1.380	1 390
DP1/DP2	4 392	4 248	4 117	3.997	3 886	3.784	3 690	3 602	3 521	3 445	3 375	3 308	3 246	3 188	3 133	3 081	3 032	2 985	2 941
ALPHA	0 043	0.045	0.047	0.048	0.050	0 052	0 053	0 055	0 056	0 058	0 059	0 061	0.062	0 063	0 065	0 066	0 068	0 069	0 070
X-MER																			
1	75 93	75 06	74.21	73.37	72 56	71 76	70 97	70 21	69 45	68 72	68 00	67 29	66 60	65 92	65 25	64 60	63 96	63 33	62 71
2	17.29	17 67	18.03	18.36	18 67	18 96	19 23	19 49	19 72	19 94	20 15	20.34	20 52	20 68	20 83	20 97	21 10	21 21	21 32
3	4.73	5.00	5.27	5.52	5.78	6 02	6 27	6 50	6 73	6 96	7 18	7 39	7 59	7 79	7 99	8 18	8 36	8 53	8 70
4	1 40	1 53	1 67	1 80	1.94	2 07	2 21	2 35	2 49	2 63	2 77	2 90	3 04	3 18	3 32	3 45	3 58	3 72	3 85
5	0 43	0 49	0 55	0 61	0 68	0 74	0 81	0 89	0 96	1 04	1.11	1.19	1 27	1 35	1 44	1.52	1 60	1 69	1 77
6	0 14	0 16	0 19	0.21	0.24	0 27	0 31	0 34	0 38	0 42	0 46	0 50	0 55	0 59	0.64	0.69	0.74	0.79	0 84
7	0 04	0 05	0 06	0 08	0.09	0 10	0 12	0 14	0 15	0 17	0 19	0 22	0 24	0 26	0 29	0 32	0 35	0 37	0 41
8	0 01	0.02	0 02	0 03	0 03	0.04	0 05	0.05	0.06	0 07	0 08	0.09	0 11	0 12	0 13	0 15	0 16	0 18	0 20
9	0.00	0.01	0.01	0.01	0 01	0.02	0.02	0.02	0 03	0 03	0 04	0 04	0 05	0 05	0 06	0.07	0 08	0 09	0 10
10	0 00	0 00	0 00	0 00	0 00	0 01	0 01	0 01	0 01	0 01	0 02	0 02	0 02	0 02	0 03	0.03	0 04	0 04	0 05
11	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0.00	0 01	0 01	0 01	0 01	0.01	0 01	0 02	0.02	0.02	0.02
12	0 00	0 00	0 00	0.00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 01	0.01	0.01	0.01	0.01	0.01
13	0 00	0.00	0 00	0.00	0 00	0.00	0 00	0 00	0 00	0.00	0 00	0.00	0 00	0 00	0 00	0 00	0 00	0 01	0 01
14	0 00	0 00	0 00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0 00	0 00	0 00	0.00	0 00	0 00	0 00	0 00
15	0.00	0 00	0.00	0 00	0 00	0.00	0 00	0 00	0 00	0 00	0 00	0.00	0 00	0 00	0 00	0 00	0 00	0 00	0 00
16	0.00	0 00	0 00	0 00	0 00	0.00	0 00	0 00	0.00	0 00	0 00	0 00	0 00	0 00	0 00	0.00	0 00	0 00	0 00
17	0 00	0 00	0 00	0 00	0 00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0 00	0.00	0.00	0 00
18+	0.00	0 00	0 00	0 00	0.00	0.00	0 00	0.00	0.00	0 00	0 00	0.00	0 00	0 00	0 00	0 00	0.00	0 00	0 00
DP 18+	18.00	18.00	18 00	18 00	18.00	18 00	18.00	18.00	18 00	18 00	18 00	18 00	18.00	18 00	18 00	18.00	18.00	18 00	18 00

WEIGHT PERCENT X-MER VS DP
MW(FOH)= 172 00
PROBABILITIES ARE 0 17 0 23 0 16 0 44

DP	1 400	1 410	1 420	1.430	1 440	1 450	1 460	1 470	1 480	1 490	1 500	1 510	1 520	1 530	1 540	1 550	1.560	1 570	1.580
DP1/DP2	2.900	2 860	2 822	2 787	2.752	2.720	2 689	2.659	2.630	2.603	2.577	2 552	2.528	2.505	2.483	2 461	2 441	2 421	2 402
ALPHA	0 071	0.073	0.074	0.075	0 076	0.078	0 079	0.080	0.081	0.082	0.083	0 084	0 086	0 087	0 088	0.089	0 090	0.091	0 092
X-MER																			
1	62.11	61.51	60.93	60 36	59 80	59 24	58.70	58 17	57 64	57 13	56 62	56 13	55 64	55 16	54.69	54.22	53 76	53 31	52.87
2	21.42	21 51	21 59	21 66	21.72	21 78	21 83	21 88	21.91	21.95	21 97	21.99	22 01	22.02	22.03	22 03	22 03	22 02	22 02
3	8 87	9 03	9.18	9 33	9 47	9 61	9 75	9 87	10 00	10 12	10.23	10 34	10.45	10 55	10.64	10.74	10.83	10 91	10 99
4	3.98	4 10	4.23	4.35	4 47	4 59	4.71	4 82	4 94	5 05	5 16	5 26	5 37	5 47	5 57	5 66	5 76	5 85	5.94
5	1 86	1 95	2 03	2.12	2 20	2 29	2.38	2.46	2.54	2.63	2.71	2.79	2 88	2 96	3 04	3 12	3 20	3 27	3.35
6	0 89	0 95	1 00	1 06	1 12	1 17	1 23	1 29	1 35	1 41	1 46	1 52	1 58	1.64	1 70	1 76	1.82	1 88	1.94
7	0 44	0 47	0.50	0 54	0 57	0 61	0 65	0 69	0 73	0 76	0 81	0 85	0 89	0 93	0 97	1 01	1 06	1 10	1 14
8	0 22	0 24	0 26	0 28	0 30	0 32	0 35	0 37	0 40	0 42	0 45	0 48	0 50	0 53	0.56	0 59	0 62	0 65	0.68
9	0.11	0.12	0.13	0.14	0.16	0 17	0 19	0 20	0 22	0 23	0 25	0 27	0 29	0 31	0 33	0 35	0.37	0.39	0 41
10	0 05	0 06	0 07	0.08	0 08	0.09	0.10	0 11	0 12	0 13	0 14	0 15	0 17	0 18	0 19	0.21	0.22	0 24	0 25
11	0 03	0 03	0 04	0 04	0 04	0 05	0 06	0 06	0 07	0 07	0 08	0 09	0 10	0 11	0 11	0 12	0 13	0 14	0 15
12	0 01	0 02	0.02	0 02	0.02	0 03	0 03	0.03	0 04	0 04	0 05	0 05	0 06	0 06	0.07	0 07	0.08	0 09	0 09
13	0 01	0 01	0 01	0 01	0 01	0 01	0 02	0 02	0 02	0 02	0 03	0 03	0 03	0 04	0 04	0 04	0.05	0 05	0 06
14	0 00	0 00	0 01	0 01	0 01	0 01	0 01	0 01	0.01	0.01	0 02	0 02	0.02	0.02	0.02	0 03	0.03	0.03	0.04
15	0 00	0 00	0 00	0.00	0.00	0.00	0.01	0 01	0.01	0 01	0 01	0.01	0 01	0 01	0 01	0 02	0 02	0 02	0 02
16	0.00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 01	0 01	0 01	0.01	0 01	0.01	0 01	0.01	0.01
17	0 00	0 00	0 00	0 00	0.00	0.00	0 00	0 00	0.00	0.00	0 00	0 00	0 00	0 00	0 01	0 01	0 01	0 01	0.01
18+	0.00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0.00	0 00	0 00	0 01	0.01	0.01	0 01	0.01	0 01	0 01	0 01
DP 18+	18.00	18 00	18 00	18 00	18.00	18 00	18 00	18 00	18 00	18 00	18 00	18 00	18 00	18 00	18 00	18 00	18 02	18 14	18 59

WEIGHT PERCENT X-MER VS DP
MW(FOH)= 172 00
PROBABILITIES ARE 0 17 0 23 0 16 0 44

DP	1 590	1 600	1 610	1 620	1 630	1 640	1 650	1 660	1 670	1.680	1.690	1 700	1 710	1 720	1 730	1.740	1 750	1.760	1.770
DP1/DP2	2 383	2 365	2 348	2 332	2 315	2 300	2.285	2 270	2 256	2.243	2.229	2.217	2 204	2 192	2 180	2 169	2 158	2 147	2 137
ALPHA	0 093	0.094	0.095	0.096	0.097	0.098	0 098	0.099	0.100	0.101	0 102	0 103	0 104	0 105	0 105	0 106	0 107	0 108	0 109
X-MER																			
1	52 44	52.01	51 59	51 17	50.76	50 36	49 96	49 57	49 19	48.81	48 44	48 07	47 71	47 35	47.00	46 65	46 31	45 97	45 64
2	22 00	21 99	21 97	21 95	21 92	21.90	21.87	21 83	21.80	21.76	21.73	21.69	21 64	21 60	21 56	21 51	21 46	21 41	21 36
3	11 07	11.15	11.22	11 29	11 35	11 41	11 47	11 53	11 58	11 63	11 68	11 72	11.77	11 81	11 84	11 88	11.91	11.94	11 97
4	6 03	6.12	6.20	6.28	6.36	6 44	6 51	6 59	6 66	6 73	6 79	6 86	6 92	6.98	7 04	7.10	7 16	7 21	7.26
5	3 43	3 50	3 57	3 65	3.72	3 79	3 86	3 93	3 99	4 06	4 12	4 19	4 25	4.31	4 37	4 43	4 49	4 54	4 60
6	2.00	2 06	2 12	2 17	2 23	2 29	2 35	2 40	2 46	2 51	2 57	2 62	2 68	2.73	2 78	2 84	2.89	2 94	2.99
7	1 19	1 23	1 28	1.32	1.36	1 41	1 45	1 50	1 54	1.59	1 63	1 67	1 72	1 76	1 81	1 85	1 89	1 93	1 98
8	0 71	0 75	0 78	0 81	0 84	0 88	0.91	0 95	0.98	1 01	1.05	1.08	1 12	1 15	1 19	1 22	1 26	1 29	1 32
9	0 43	0 46	0 48	0 50	0 53	0 55	0 58	0.60	0.63	0.65	0.68	0.71	0 73	0.76	0.79	0 81	0 84	0 87	0 90
10	0.27	0.28	0 30	0.32	0 33	0 35	0 37	0 39	0 41	0 42	0 44	0 46	0.48	0.50	0 53	0.55	0 57	0 59	0 61
11	0 16	0 17	0.19	0 20	0 21	0.22	0.24	0.25	0.26	0 28	0.29	0 31	0 32	0 34	0 35	0 37	0 39	0 40	0 42
12	0 10	0 11	0 12	0 13	0 13	0 14	0.15	0.16	0.17	0.18	0 19	0.20	0.22	0.23	0 24	0 25	0 26	0 28	0 29
13	0.06	0.07	0.07	0 08	0.09	0 09	0 10	0 11	0.11	0 12	0 13	0.14	0 14	0.15	0.16	0.17	0.18	0.19	0.20
14	0.04	0.04	0 05	0 05	0 05	0.06	0 06	0 07	0.07	0 08	0 09	0 09	0.10	0.10	0 11	0.12	0.12	0 13	0.14
15	0 02	0.03	0 03	0.03	0 04	0 04	0.04	0.05	0.05	0 05	0 06	0 06	0 07	0 07	0.08	0.08	0 09	0 09	0.10
16	0 02	0.02	0.02	0 02	0.02	0 02	0.03	0.03	0.03	0.04	0 04	0 04	0 04	0 05	0 05	0 06	0 06	0 06	0.07
17	0.01	0 01	0.01	0.01	0.01	0 02	0 02	0.02	0.02	0.02	0 03	0 03	0 03	0 03	0 04	0 04	0 04	0 04	0 05
18+	0.02	0 02	0 02	0.02	0 03	0 03	0.03	0.04	0.04	0.05	0 05	0 06	0 06	0 07	0 08	0 09	0 09	0 10	0 11
DP 18+	18.55	18 56	18 84	18 89	18 80	19 07	19 22	19 24	19.31	19 44	19 51	19.60	19 61	19 63	19.75	19.74	19 81	19.85	19 93

WEIGHT PERCENT X-MER VS DP
MW(FOH)= 172 00
PROBABILITIES ARE 0 17 0 23 0 16 0 44

DP	1 780	1 790	1 800	1 810	1 820	1 830	1 840	1 850	1 860	1 870	1 880	1 890	1 900	1 910	1 920	1 930	1.940	1 950	1 960
DP1/DP2	2 127	2 117	2.107	2 098	2 089	2 080	2 071	2 063	2 054	2 046	2 039	2 031	2 023	2 016	2 009	2 002	1.995	1 989	1 982
ALPHA	0.110	0.110	0 111	0 112	0 113	0 113	0 114	0 115	0 116	0 116	0 117	0 118	0 118	0 119	0 120	0 120	0 121	0 122	0 122
X-MER																			
1	45 32	44 99	44 67	44 36	44 05	43 75	43 44	43 15	42 85	42 56	42 28	42 00	41 72	41 45	41 17	40 91	40 64	40 38	40 12
2	21 31	21 26	21 20	21 15	21 09	21 03	20 98	20 92	20 86	20 80	20 74	20 68	20 62	20 56	20 49	20 43	20 37	20 31	20 24
3	12 00	12 03	12 05	12 07	12 09	12 11	12 13	12 14	12 16	12 17	12 18	12 19	12 20	12 20	12 21	12 21	12.22	12 22	12 22
4	7 31	7 36	7 41	7 46	7 50	7 54	7 59	7 63	7 66	7 70	7 74	7 77	7 81	7 84	7 87	7 90	7 93	7 95	7 98
5	4 65	4 70	4 76	4 81	4 86	4 90	4 95	5 00	5 04	5 09	5 13	5 17	5 21	5 25	5 29	5 33	5 37	5 40	5 44
6	3 04	3 09	3 13	3 18	3 23	3 27	3 32	3 36	3 41	3 45	3 49	3 53	3 57	3 61	3 65	3 69	3 73	3 77	3 80
7	2 02	2 06	2 10	2 14	2 18	2 22	2 26	2 30	2 34	2 38	2 42	2 46	2 49	2 53	2 57	2 60	2 64	2 67	2 71
8	1 36	1 39	1 43	1 46	1 50	1 53	1 56	1 60	1 63	1 66	1 70	1 73	1 76	1 80	1 83	1 86	1 89	1 92	1 95
9	0 92	0 95	0 98	1 01	1 04	1 06	1 09	1 12	1 15	1 18	1 20	1 23	1 26	1 29	1 31	1 34	1 37	1 40	47
10	0 63	0 65	0 68	0 70	0 72	0 74	0 77	0 79	0 81	0 84	0 86	0 88	0 91	0 93	0 95	0 97	1 00	1 02	1 04
11	0 44	0 45	0 47	0 49	0 51	0 52	0 54	0 56	0 58	0 60	0.62	0 64	0 65	0 67	0 69	0 71	0 73	0 75	0 77
12	0 30	0 32	0 33	0 34	0 36	0.37	0.39	0 40	0 41	0 43	0 45	0 46	0 48	0 49	0 51	0 52	0 54	0 56	0 57
13	0 21	0 22	0 23	0 24	0.25	0 26	0.27	0 29	0 30	0 31	0 32	0 33	0 35	0 36	0 37	0 39	0 40	0 41	0 43
14	0 15	0 15	0 16	0 17	0.18	0 19	0 20	0 21	0 22	0 22	0 23	0 24	0 25	0 26	0 28	0 29	0 30	0 31	0 32
15	0.10	0 11	0 11	0 12	0.13	0 13	0 14	0 15	0 16	0 16	0 17	0 18	0 19	0 20	0 20	0 21	0 22	0 23	0 24
16	0 07	0 08	0 08	0 09	0 09	0 10	0 10	0 11	0 11	0 12	0 13	0 13	0 14	0 14	0 15	0 16	0 16	0 17	0 18
17	0 05	0.05	0 06	0 06	0 07	0 07	0 07	0 08	0 08	0 09	0 09	0 10	0 10	0 11	0 11	0 12	0 12	0 13	0 14
18+	0 12	0 13	0 14	0 15	0 17	0 18	0 19	0 21	0 22	0 24	0 26	0 27	0 29	0 31	0 33	0 35	0 38	0 40	0 42
DP 18+	19 99	20 01	20 05	20 11	20 15	20 18	20 20	20 23	20 30	20 33	20 37	20 41	20 46	20 47	20 52	20 55	20 58	20 64	20 67

WEIGHT PERCENT X-MER VS DP
MW(FOH)= 172 00
PROBABILITIES ARE 0 17 0 23 0 16 0 44

DP	1 970	1 980	1 990	2.000	2 010	2 020	2 030	2 040	2 050	2 060	2 070	2 080	2 090	2 100	2 110	2 120	2 130	2 140	2 150
DP1/DP2	1 976	1 970	1 964	1 958	1 952	1.946	1 941	1 935	1 930	1 925	1 920	1 915	1 910	1 905	1 900	1 896	1 891	1 887	1 882
ALPHA	0 123	0 124	0 124	0 125	0 126	0.126	0 127	0 127	0 128	0 129	0 129	0 130	0 130	0 131	0 132	0 132	0 133	0 133	0 134
X-MER																			
1	39 87	39 62	39 37	39.12	38 88	38 64	38 41	38 17	37 94	37 71	37 49	37 27	37 05	36 83	36 61	36 40	36 19	35 98	35 78
2	20 18	20 11	20 05	19.99	19.92	19 86	19 79	19 73	19 66	19 60	19 53	19 46	19 40	19 33	19 27	19 20	19 14	19 07	9 01
3	12 27	12 22	12 22	12.21	12.21	12 20	12 20	12 19	12 18	12 18	12 17	12 16	12 15	12 14	12 12	12 11	12 10	12 09	12 07
4	8 00	8 03	8 05	8 07	8 09	8 11	8 13	8 15	8 17	8 18	8 20	8 21	8 23	8 24	8 25	8 26	8 27	8 28	8 29
5	5 47	5 50	5 54	5 57	5 60	5 63	5 66	5 69	5 71	5 74	5 77	5 79	5 81	5 84	5 86	5 88	5 90	5 92	5 94
6	3 84	3 88	3 91	3 94	3 98	4 01	4 04	4 07	4 10	4 13	4 16	4 19	4 27	4 25	4 27	4 30	4 33	4 35	4 37
7	2 74	2 78	2 81	2 84	2.88	2 91	2 94	2 97	3 00	3 03	3 06	3 09	3 12	3 14	3 17	3 20	3 23	3 25	3 28
8	1 99	2 02	2 05	2.08	2.11	2 14	2 16	2 19	2 22	2 25	2 28	2 30	2 33	2 36	2 38	2 41	2 44	2 46	2 49
9	1 45	1 48	1 50	1 53	1 56	1 58	1 61	1 64	1 66	1 69	1 71	1 74	1 76	1 79	1 81	1 83	1 86	1 88	1 91
10	1 07	1 09	1 11	1 14	1 16	1 18	1 21	1 23	1 25	1 27	1 30	1 32	1 34	1 36	1 38	1 41	1 43	1 45	47
11	0.79	0 81	0 83	0 85	0 87	0 89	0 91	0 93	0 95	0 97	0 99	1 01	1 03	1 05	1 06	1 08	1 10	1 12	4
12	0.59	0 60	0 62	0 64	0 65	0 67	0 69	0 70	0 72	0 74	0 76	0 77	0 79	0 81	0 82	0 84	0 86	0 87	0 89
13	0 44	0 45	0 47	0 48	0 49	0 51	0 52	0 54	0 55	0 57	0 58	0 60	0 61	0 62	0 64	0 65	0 67	0 68	0 70
14	0.33	0.34	0 35	0 36	0 38	0 39	0 40	0 41	0 42	0 44	0 45	0 46	0 47	0 49	0 50	0 51	0 52	0 54	0 55
15	0 25	0 26	0 27	0 28	0.29	0.30	0 31	0 32	0 33	0 34	0 35	0 36	0 37	0 38	0 39	0 40	0 41	0 42	0 43
16	0 19	0 19	0.20	0.21	0 22	0 23	0 23	0 24	0 25	0 26	0 27	0 28	0 29	0 30	0 30	0 31	0 32	0 33	0 34
17	0 14	0 15	0.15	0 16	0 17	0 17	0 18	0 19	0 19	0 20	0 21	0 22	0 22	0 23	0 24	0 25	0 25	0 26	0.27
18+	0 45	0 47	0 50	0 53	0 56	0 59	0 62	0 65	0 68	0 71	0 75	0 79	0 82	0 86	0 90	0 94	0 98	1 02	1 07
DP 18+	20 71	20 73	20 76	20 80	20 83	20 87	20 90	20 94	20 98	21 02	21 05	21 09	21 12	21 16	21 19	21 22	21 26	21 29	21 33

WEIGHT PERCENT X-MER VS DP
MW(POH)= 186.00
PROBABILITIES ARE 0 17 0 23 0 16 0 44

DP	1 020	1 030	1 040	1.050	1 060	1 070	1 080	1 090	1 100	1 110	1 120	1 130	1 140	1.150	1 160	1.170	1 180	1 190	1.200
DP1/DP235	27623	90818	22514.81612	54410	921 9	705 8.760	8.004	7 385	6 870	6 435	6 062	5 739	5 457	5 208	4 987	4 789	4 611		
ALPHA	0 005	0.007	0.010	0.012	0.014	0 016	0 019	0 021	0 023	0 025	0.027	0 029	0.031	0 033	0 034	0 036	0 038	0 040	0 042
X-MER																			
1	97.15	95.78	94.45	93 15	91.88	90.65	89 45	88.28	87 14	86 02	84 93	83.87	82 84	81 82	80 84	79.87	78.93	78 00	77 10
2	2 75	4 01	5.18	6 29	7.33	8.30	9 22	10 08	10 89	11 65	12 36	13 03	13 66	14 26	14 81	15 34	15 83	16 29	16 72
3	0 09	0 20	0 34	0 51	0 71	0 92	1 15	1 39	1 65	1 91	2 18	2 45	2.73	3.01	3.29	3 57	3 84	4 12	4 39
4	0 00	0.01	0 02	0 05	0 07	0 11	0 16	0 21	0 27	0 34	0 42	0 50	0.59	0 69	0.79	0 90	1 01	1 13	1 25
5	0 00	0 00	0 00	0 00	0 01	0.01	0 02	0 03	0 05	0 06	0 08	0 11	0.13	0 17	0 20	0 24	0 28	0 32	0 37
6	0 00	0 00	0 00	0 00	0.00	0 00	0 00	0 01	0 01	0 01	0 02	0 02	0 03	0 04	0 05	0 06	0 08	0 10	0 11
7	0 00	0 00	0.00	0.00	0.00	0 00	0 00	0.00	0 00	0 00	0 00	0 01	0 01	0 01	0 01	0 02	0.02	0.03	0 04
8	0 00	0 00	0.00	0 00	0 00	0 00	0 00	0.00	0.00	0 00	0.00	0.00	0 00	0 00	0 00	0 00	0 01	0 01	0 01
9	0 00	0 00	0 00	0 00	0.00	0 00	0 00	0 00	0 00	0 00	0 00	0.00	0 00	0 00	0 00	0.00	0.00	0.00	0 00
10	0 00	0.00	0.00	0.00	0.00	0 00	0 00	0 00	0 00	0.00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00
11	0 00	0 00	0.00	0.00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0.00	0 00	0.00	0 00	0 00	0 00
12	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0.00	0.00	0.00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0.00	0 00
13	0 00	0 00	0 00	0.00	0 00	0 00	0 00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0 00	0 00	0 00	0.00	0 00
14	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00
15	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00
16	0.00	0 00	0.00	0 00	0.00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00
17	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00
18+	0.00	0 00	0.00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00
DP 18+	18 00	18 00	18 00	18 00	18 00	18 00	18 00	18 00	18 00	18 00	18 00	18 00	18 00	18 00	18 00	18 00	18 00	18 00	18 00

WEIGHT PERCENT X-MER VS DP
MW(POH)= 186 00
PROBABILITIES ARE 0 17 0.23 0 16 0 44

DP	1 210	1 220	1 230	1 240	1 250	1.260	1.270	1 280	1 290	1 300	1 310	1 320	1 330	1 340	1.350	1 360	1.370	1 380	1 390
DP1/DP2	4 450	4 305	4 172	4 050	3.938	3 835	3.739	3 650	3 568	3.491	3.420	3.352	3 289	3 230	3 174	3 122	3.072	3 025	2 981
ALPHA	0 043	0 045	0 047	0.048	0.050	0 052	0 053	0 055	0 056	0 058	0 059	0 061	0 062	0.063	0 065	0.066	0 068	0 069	0 070
X-MER																			
1	76 22	75 35	74 51	73 68	72.87	72 08	71.30	70 54	69 80	69 07	68 36	67 66	66 97	66.30	65.64	64 99	64.35	63.73	63 12
2	17.13	17.51	17 86	18 19	18 51	18 80	19 07	19 32	19 56	19 78	19 99	20 18	20 36	20 52	20.68	20 82	20.95	21 07	21 18
3	4.66	4 92	5 18	5 44	5 69	5 93	6 17	6 40	6 63	6.85	7 07	7 28	7 48	7 68	7 88	8 06	8.24	8 42	8 59
4	1 38	1.50	1.63	1.76	1 90	2 03	2 17	2 30	2 44	2 58	2 71	2 85	2 99	3.12	3.26	3 39	3 52	3 65	3 78
5	0 42	0 48	0.54	0 60	0 66	0 73	0 80	0 87	0 94	1 01	1 09	1 17	1 25	1.33	1.41	1 49	1 57	1 65	1 74
6	0 13	0 16	0.18	0.21	0 24	0 27	0 30	0 33	0 37	0 41	0 45	0 49	0 53	0 58	0 62	0 67	0 72	0 77	0 82
7	0 04	0 05	0 06	0 07	0 09	0 10	0 12	0 13	0 15	0 17	0 19	0 21	0 23	0 26	0 28	0 31	0 34	0 37	0 40
8	0 01	0 02	0 02	0 03	0.03	0.04	0 04	0 05	0 06	0 07	0 08	0 09	0 10	0 12	0 13	0 14	0 16	0 18	0 19
9	0 00	0 01	0 01	0 01	0 01	0 01	0 02	0 02	0 03	0 03	0 03	0 04	0 05	0 05	0 06	0 07	0 08	0 09	0 10
10	0.00	0.00	0.00	0 00	0 00	0 01	0 01	0 01	0 01	0 01	0 01	0 02	0 02	0 02	0 03	0 03	0 04	0 04	0 05
11	0.00	0.00	0.00	0 00	0 00	0 00	0 00	0 00	0 00	0 01	0.01	0 01	0 01	0 01	0 01	0 02	0 02	0 02	0 02
12	0.00	0.00	0.00	0 00	0.00	0 00	0.00	0.00	0.00	0 00	0 00	0 00	0 00	0 01	0 01	0 01	0 01	0 01	0 01
13	0 00	0 00	0 00	0 00	0.00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0.00	0.00	0 00	0 01	0 01
14	0 00	0.00	0.00	0.00	0.00	0.00	0 00	0 00	0.00	0 00	0 00	0 00	0 00	0.00	0 00	0.00	0.00	0 00	0 00
15	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0 00	0.00	0 00	0 00
16	0.00	0 00	0 00	0 00	0.00	0.00	0.00	0 00	0.00	0 00	0.00	0.00	0.00	0.00	0.00	0.00	0 00	0.00	0 00
17	0 00	0.00	0.00	0 00	0 00	0 00	0.00	0 00	0 00	0 00	0.00	0.00	0.00	0.00	0 00	0 00	0 00	0.00	0.00
18+	0 00	0.00	0 00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0 00	0.00	0 00	0.00	0 00	0 00	0 00	0 00
DP 18+	18 00	18.00	18.00	18 00	18 00	18 00	18 00	18.00	18 00	18 00	18 00	18.00	18 00	18 00	18.00	18 00	18 00	18 00	18.00

WEIGHT PERCENT X-MER VS DP
MW(FOH)= 186 00
PROBABILITIES ARE 0 17 0 23 0 16 0 44

DP	1 400	1 410	1 420	1 430	1 440	1 450	1 460	1 470	1 480	1 490	1.500	1 510	1 520	1 530	1 540	1 550	1 560	1.570	1 580
DP1/DP2	2 938	2.898	2 860	2 824	2 789	2 756	2 725	2.694	2 665	2 638	2 611	2 586	2 562	2 538	2 516	2 494	2 473	2.453	2.434
ALPHA	0 071	0 073	0.074	0 075	0.076	0 078	0 079	0 080	0 081	0 082	0 083	0 084	0 086	0.087	0.088	0.089	0 090	0 091	0 092
X-MER																			
1	62 52	61.93	61 35	60 78	60 22	59 67	59 14	58.61	58.09	57.58	57.07	56 58	56 09	55 62	55 15	54 68	54 23	53 78	53 34
2	21 28	21 37	21.45	21.52	21 59	21 65	21 71	21 75	21 79	21 83	21.86	21.88	21 90	21 91	21 92	21 93	21 93	21 93	21 92
3	8 75	8 91	9 06	9 21	9.35	9.49	9.62	9.75	9 87	9.99	10.11	10 22	10 32	10.42	10 52	10 61	10.70	10.79	10 87
4	3 91	4.03	4 16	4.28	4.40	4.52	4 63	4.74	4.86	4.97	5.07	5.18	5.28	5 38	5 48	5 58	5 67	5 76	5.85
5	1.82	1 91	1.99	2.08	2.16	2.25	2 33	2 41	2 50	2 58	2 66	2 74	2 82	2.90	2.98	3.06	3 14	3 22	3 29
6	0 87	0 93	0 98	1 04	1 09	1 15	1 20	1 26	1 32	1 38	1 43	1 49	1 55	1 61	1 67	1 73	1 79	1 84	1 90
7	0 43	0 46	0.49	0.53	0.56	0.60	0 63	0.67	0 71	0 75	0 79	0 83	0 87	0 91	0.95	0.99	1 03	1 08	1 12
8	0 21	0 23	0.25	0 27	0 29	0 31	0 34	0 36	0.39	0 41	0 44	0 46	0 49	0.52	0 55	0 58	0 61	0 64	0 67
9	0 11	0.12	0.13	0.14	0.15	0 17	0 18	0 20	0 21	0 23	0 25	0 26	0 28	0 30	0 32	0 34	0 36	0.38	0 40
10	0 05	0 06	0 07	0 07	0.08	0.09	0 10	0.11	0 12	0 13	0.14	0 15	0 16	0 17	0 19	0 20	0 21	0 23	0 24
11	0 03	0 03	0.03	0.04	0 04	0 05	0 05	0 06	0.07	0 07	0 08	0 09	0 09	0 10	0.11	0.12	0 13	0 14	0 15
12	0.01	0.02	0.02	0.02	0.02	0.03	0 03	0.03	0.04	0 04	0 05	0 05	0 06	0 06	0 07	0 07	0 08	0 08	0 09
13	0 01	0 01	0 01	0 01	0 01	0 01	0.02	0 02	0.02	0 02	0 03	0 03	0 03	0 04	0 04	0 04	0 05	0 05	0 06
14	0 00	0 00	0 01	0 01	0 01	0 01	0 01	0 01	0 01	0 01	0 02	0.02	0.02	0 02	0 02	0 03	0 03	0 03	0 03
15	0 00	0 00	0 00	0 00	0 00	0.00	0 01	0 01	0.01	0.01	0.01	0 01	0 01	0 01	0 01	0 02	0 02	0 02	0 02
16	0.00	0 00	0 00	0.00	0.00	0 00	0 00	0 00	0 00	0 00	0 01	0 01	0 01	0.01	0.01	0.01	0 01	0 01	0.01
17	0 00	0 00	0 00	0.00	0 00	0.00	0.00	0 00	0.00	0 00	0 00	0 00	0 00	0 00	0 01	0.01	0 01	0 01	0 01
18+	0.00	0.00	0.00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 01	0.01	0.01	0.01	0.01	0 01	0 01	0 01
DP 18+	18 00	18 00	18.00	18 00	18.00	18 00	18 00	18 00	18 00	18 00	18 00	18 00	18 00	18 00	18 00	18 00	18 02	18 14	18 59

WEIGHT PERCENT X-MER VS DP
MW(FOH)= 186.00
PROBABILITIES ARE 0 17 0 23 0 16 0 44

DP	1 590	1 600	1 610	1 620	1.630	1.640	1.650	1.660	1 670	1 680	1.690	1 700	1 710	1 720	1 730	1 740	1 750	1 760	1 770
DP1/DP2	2.415	2 397	2 379	2.363	2 346	2 331	2 315	2.301	2 286	2 273	2 259	2 246	2 234	2 221	2 209	2 198	2 187	2 176	2 165
ALPHA	0 093	0.094	0 095	0 096	0 097	0 098	0 098	0 099	0 100	0 101	0 102	0 103	0 104	0 105	0.105	0.106	0 107	0.108	0 109
X-MER																			
1	52 91	52 48	52.06	51.65	51 24	50 84	50 45	50.06	49.68	49 30	48.93	48.56	48 20	47 85	47 50	47 15	46 81	46.48	46 15
2	21 91	21.90	21.88	21.86	21.84	21.82	21.79	21.76	21 73	21 69	21 66	21 62	21 58	21.54	21 50	21.45	21 41	21.36	21 31
3	10 95	11.03	11 10	11 17	11 23	11 29	11 35	11.41	11 46	11 51	11.56	11 61	11.65	11.69	11 73	11 77	11 80	11.84	11 87
4	5 94	6.02	6 11	6.19	6.27	6.34	6 42	6 49	6 56	6 63	6.70	6 76	6 83	6.89	6 95	7 00	7.06	7.12	7 17
5	3 37	3 44	3 51	3 58	3 65	3.72	3.79	3.86	3 93	3.99	4 05	4 12	4 18	4 24	4 30	4 36	4 41	4 47	4 52
6	1 96	2 02	2 08	2 13	2 19	2 25	2 30	2 36	2.41	2.47	2 52	2 58	2 63	2 68	2 73	2 78	2.84	2 89	2 93
7	1 16	1.21	1.25	1 29	1 34	1 38	1 42	1 47	1 51	1.55	1.60	1.64	1.68	1.73	1.77	1.81	1 85	1 90	1.94
8	0 70	0 73	0.76	0 79	0.83	0.86	0 89	0 92	0.96	0 99	1 03	1 06	1 09	1.13	1 16	1 20	1 23	1.26	1 30
9	0.42	0.45	0 47	0.49	0 52	0.54	0 56	0 59	0 61	0 64	0 66	0 69	0 72	0 74	0.77	0 80	0 82	0.85	0.88
10	0 26	0.28	0 29	0 31	0 32	0 34	0 36	0 38	0 40	0.42	0.43	0 45	0.47	0 49	0 51	0 53	0 56	0.58	0 60
11	0 16	0.17	0 18	0 19	0.21	0 22	0 23	0.24	0.26	0.27	0 29	0 30	0 31	0 33	0 35	0 36	0.38	0 39	0.41
12	0 10	0 11	0 11	0 12	0 13	0 14	0.15	0 16	0.17	0 18	0.19	0 20	0 21	0 22	0 23	0 24	0 26	0 27	0 28
13	0 06	0 07	0.07	0 08	0 08	0.09	0 10	0.10	0 11	0 12	0 12	0 13	0 14	0 15	0 16	0 17	0 18	0 19	0 19
14	0.04	0 04	0 05	0.05	0 05	0 06	0 06	0.07	0 07	0 08	0.08	0 09	0 09	0.10	0 11	0.11	0 12	0 13	0 14
15	0 02	0.03	0.03	0.03	0.03	0 04	0 04	0 04	0 05	0 05	0 06	0.06	0.06	0.07	0 07	0.08	0.08	0 09	0 09
16	0 01	0.02	0 02	0.02	0 02	0 02	0 03	0 03	0 03	0.03	0 04	0.04	0.04	0.05	0.05	0.05	0.06	0.06	0 07
17	0 01	0 01	0.01	0 01	0.01	0 02	0.02	0 02	0 02	0 02	0 02	0 03	0.03	0 03	0 03	0.04	0 04	0 04	0 05
18+	0 02	0 02	0 02	0 02	0.03	0 03	0 03	0.04	0 04	0 05	0 05	0 06	0 06	0 07	0.08	0 08	0 09	0 10	0 11
DP 18+	18 55	18 56	18 84	18 89	18.80	19.07	19.22	19 24	19 31	19 44	19 51	19 60	19.61	19.63	19.75	19 74	19 81	19 85	19 93

WEIGHT PERCENT X-MER VS DP
MW(FOH)= 186 00
PROBABILITIES ARE 0 17 0 23 0 16 0 44

DP	1 780	1 790	1 800	1 810	1 820	1 830	1 840	1 850	1 860	1 870	1 880	1 890	1 900	1 910	1 920	1 930	1 940	1 950	1 960
DP1/DP2	2 155	2 145	2 135	2 126	2 116	2 107	2 099	2 090	2 082	2 074	2 066	2 058	2 050	2 043	2 036	2 029	2 022	2 015	2 009
ALPHA	0 110	0 110	0 111	0 112	0 113	0 113	0 114	0 115	0 116	0 116	0 117	0 118	0.118	0 119	0 120	0 120	0.121	0 122	0 122
X-MER																			
1	45 82	45 50	45 18	44 87	44 56	44 26	43.96	43 66	43.37	43 08	42 79	42 51	42 24	41 96	41 69	41 42	41 16	40 90	40 64
2	21 26	21 21	21 16	21 11	21 06	21 00	20 95	20 89	20 83	20 78	20 72	20 66	20 60	20 54	20 48	20 42	20 36	20 30	20 23
3	11 89	11 92	11 95	11.97	11 99	12 01	12 03	12 04	12 06	12 07	12.08	12.09	12 10	12.11	12 12	12 12	12 12	12 13	12 13
4	7 22	7.27	7.32	7 36	7 41	7.45	7 49	7 53	7 57	7 61	7 64	7 68	7 71	7 75	7 78	7 81	7 84	7 86	7 89
5	4 58	4 63	4 68	4 73	4 78	4 83	4 88	4 92	4.97	5 01	5 05	5 10	5 14	5 18	5 22	5 25	5 29	5 33	5 36
6	2 98	3 03	3 08	3 13	3 17	3 22	3 26	3 31	3 35	3 39	3 43	3 47	3 52	3 56	3 59	3 63	3 67	3 71	3 74
7	1 98	2 02	2 06	2.10	2 14	2 18	2 22	2 26	2 30	2 34	2 38	2 41	2 45	2 49	2 52	2 56	2 59	2 63	2 66
8	1 33	1 37	1.40	1 43	1.47	1.50	1 53	1 57	1 60	1 63	1 67	1 70	1 73	1.76	1 79	1 83	1 86	1 89	1 92
9	0 90	0 93	0 96	0 99	1 01	1 04	1 07	1 10	1 12	1 15	1 18	1 21	1 23	1 26	1 29	1 32	1 34	1 37	1 40
10	0 62	0 64	0 66	0 68	0 71	0 73	0 75	0 77	0 80	0 82	0 84	0 86	0 89	0 91	0 93	0 95	0 98	1 00	1 02
11	0 43	0 44	0 46	0 48	0 49	0 51	0 53	0 55	0 57	0 59	0 60	0 62	0 64	0 66	0 68	0.70	0 72	0 74	0 76
12	0 29	0 31	0 32	0 33	0 35	0 36	0.38	0 39	0 41	0 42	0 44	0 45	0 47	0 48	0 50	0 51	0 53	0 54	0 56
13	0 20	0 21	0 23	0 24	0 25	0 26	0 27	0 28	0 29	0 30	0 32	0 33	0 34	0 35	0 36	0 38	0 39	0 40	0 42
14	0 14	0 15	0 16	0 17	0 17	0 18	0 19	0 20	0 21	0 22	0 23	0 24	0 25	0 26	0 27	0 28	0 29	0 30	0 31
15	0 10	0 11	0 11	0 12	0 12	0 13	0 14	0 14	0 15	0 16	0 17	0 17	0 18	0 19	0 20	0 21	0 22	0 22	0 23
16	0 07	0 07	0 08	0 08	0.09	0.09	0 10	0 10	0 11	0 12	0 12	0 13	0 13	0 14	0 15	0 15	0 16	0 17	0 18
17	0 05	0 05	0.06	0 06	0 06	0 07	0 07	0 08	0 08	0 08	0 09	0 09	0 10	0 10	0 11	0 11	0 12	0 13	0 13
18+	0 12	0 13	0 14	0 15	0 16	0 18	0 19	0 20	0 22	0 23	0 25	0 27	0 29	0 30	0 32	0 35	0 37	0 39	0 4.
DP 18+	19 99	20 01	20 05	20 11	20 15	20 18	20 20	20 23	20 30	20 33	20 37	20 41	20 46	20 47	20 52	20 55	20 58	20 64	20 67

WEIGHT PERCENT X-MER VS DP
MW(FOH)= 186 00
PROBABILITIES ARE 0 17 0 23 0 16 0 44

DP	1 970	1 980	1 990	2 000	2 010	2 020	2 030	2 040	2 050	2 060	2 070	2 080	2 090	2 100	2 110	2 120	2 130	2 140	2 150
DP1/DP2	2 002	1 996	1 990	1 984	1 978	1 972	1 967	1 961	1 356	1 950	1 945	1 940	1.935	1 930	1 926	1 921	1 916	1 912	1 907
ALPHA	0 123	0 124	0 124	0 125	0 126	0 126	0 127	0 127	0 128	0 129	0 129	0 130	0 130	0 131	0 132	0 .32	0 133	0 133	0 134
X-MER																			
1	40 39	40 14	39 89	39 65	39 40	39 16	38 93	38 70	38 46	38 24	38 01	37 79	37 57	37 35	37 14	36 92	36 71	36 51	36 30
2	20 17	20 11	20 05	19 99	19 92	19 86	19 80	19 73	19 67	19 61	19 54	19 48	19 41	19 35	19 29	19 22	19 16	19 10	19 03
3	12 13	12 13	12 13	12 13	12 13	12 12	12 12	12 11	12 11	12 10	12 09	12 08	12 07	12 06	2 05	12 04	12 03	12 02	12 0.
4	7 92	7 94	7 96	7 99	8 01	8 03	8 05	8 07	8.08	8 10	8 12	8.13	8 14	8 16	8 17	8 18	8 19	8 20	8 2
5	5 40	5 43	5 46	5 49	5.52	5 55	5 58	5 61	5 64	5 66	5 69	5 72	5 74	5 76	5 79	5 81	5 83	5 85	5 87
6	3 78	3 81	3 85	3 88	3 92	3 95	3 98	4 01	4.04	4.07	4 10	4 13	4 16	4 18	4 21	4 24	4 26	4 29	4 3.
7	2.70	2.73	2 76	2 79	2 83	2 86	2 89	2 92	2 95	2 98	3 01	3 04	3 07	3 09	3 12	3 15	3 17	3 20	3 23
8	1 95	1 98	2 01	2 04	2 07	2 10	2 13	2 15	2 18	2 21	2 24	2 26	2 29	2 32	2 34	2 37	2 39	2 42	2 44
9	1 42	1 45	1 48	1 50	1 53	1 55	1 58	1 60	1 63	1.65	1 68	1 70	1 73	1 75	1 78	1 80	1 82	1 85	87
10	1 05	1 07	1 09	1 11	1 14	1 16	1 18	1 20	1 23	1 25	1 27	1 29	1 31	1 34	1 36	1 38	1 40	1 42	1 44
11	0 77	0 79	0 81	0 83	0 85	0 87	0 89	0 91	0 93	0 95	0 97	0 99	1 01	1 02	1 04	1 06	1 08	1 10	1 12
12	0 58	0 59	0 61	0 62	0 64	0 66	0 67	0 69	0 71	0 72	0 74	0 76	0 77	0 79	0 81	0 82	0 84	0 86	0 87
13	0 43	0 44	0 46	0 47	0 48	0 50	0 51	0 53	0 54	0 55	0 57	0 58	0 60	0 61	0 63	0 64	0 65	0 67	0 68
14	0 32	0 33	0 34	0 36	0 37	0 38	0 39	0 40	0 41	0 43	0 44	0 45	0 46	0 47	0 49	0 50	0 51	0 52	0 54
15	0 24	0 25	0 26	0 27	0.28	0 29	0 30	0 31	0 32	0 33	0 34	0 35	0 36	0 37	0 38	0 39	0 40	0 41	0 42
16	0 18	0 19	0 20	0 21	0 21	0 22	0 23	0 24	0 25	0 25	0 26	0 27	0 28	0 29	0 30	0 31	0 32	0 33	0 33
17	0 14	0 14	0.15	0 16	0 16	0 17	0 18	0 18	0 19	0 20	0 20	0 21	0 22	0 23	0 23	0 24	0 25	0 26	0 26
18+	0 44	0 46	0 49	0 51	0 54	0 57	0 60	0 63	0 67	0 70	0 73	0 77	0 80	0 84	0 88	0 92	0 96	1 00	1 04
DP 18+	20 71	20 73	20.76	20 80	20 83	20 87	20 90	20 94	20 98	21 02	21 05	21 09	21 12	21 16	21 19	21 22	21 26	21 29	21 33

WEIGHT PERCENT X-MER VS DP
MW(FOH)= 214 00
PROBABILITIES ARE 0 17 0 23 0 16 0 44

DP	1 020	1.030	1 040	1 050	1 060	1 070	1 080	1 090	1 100	1.110	1 120	1.130	1 140	1 150	1 160	1.170	1 180	1 190	1.200
DP1/DP2	36.13024	.48718	66615	17512	.84811	.186	9.940	8.972	8.197	7.564	7 037	6 591	6 209	5 878	5 589	5 334	5 108	4 905	4 723
ALPHA	0.005	0 007	0.010	0 012	0 014	0.016	0.019	0.021	0.023	0.025	0 027	0.029	0 031	0 033	0 034	0 036	0.038	0 040	0 042
X-MER																			
1	97.21	95 88	94 57	93 31	92 07	90 86	89 69	88 54	87 43	86 34	85 27	84 23	83 22	82 22	81 26	80 31	79 38	78 48	77 59
2	2 69	3 92	5 07	6 15	7.17	8 12	9.02	9 87	10 67	11 41	12 12	12 78	13 40	13 99	14.54	15 06	15 54	16 00	16 43
3	0.09	0 20	0.33	0 50	0 68	0 89	1.11	1 35	1 59	1 85	2.11	2.38	2 64	2 92	3 19	3 46	3 73	3 99	4 26
4	0 00	0.01	0 02	0 04	0 07	0 11	0 15	0 20	0 26	0 33	0 40	0.48	0 57	0 66	0 76	0 87	0 97	1 09	1 20
5	0.00	0.00	0.00	0.00	0.01	0.01	0 02	0 03	0 04	0.06	0 08	0 10	0 13	0.16	0 19	0 23	0 27	0 31	0 36
6	0 00	0 00	0.00	0 00	0 00	0 00	0 00	0 01	0.01	0 01	0.02	0 02	0.03	0.04	0.05	0.06	0.08	0.09	0.11
7	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0.00	0.00	0 00	0 00	0 00	0.01	0 01	0 01	0 02	0 02	0 03	0 03
8	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0.00	0.00	0 00	0 00	0 00	0 00	0.00	0.00	0.00	0 01	0 01	0.01
9	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0.00	0.00	0 00	0 00	0 00	0 00	0 00	0.00	0 00	0 00	0 00	0 00
10	0.00	0.00	0.00	0 00	0 00	0.00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00
11	0 00	0 00	0 00	0 00	0 00	0.00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0.00	0.00
12	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0.00	0.00	0.00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00
13	0 00	0.00	0.00	0.00	0 00	0.00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00
14	0 00	0 00	0 00	0 00	0.00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0.00	0.00	0.00	0.00
15	0 00	0 00	0.00	0 00	0.00	0.00	0 00	0 00	0.00	0 00	0 00	0.00	0 00	0.00	0 00	0 00	0.00	0 00	0 00
16	0 00	0 00	0.00	0 00	0.00	0.00	0 00	0.00	0.00	0 00	0 00	0 00	0 00	0 00	0.00	0.00	0.00	0 00	0 00
17	0 00	0 00	0.00	0 00	0 00	0.00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00
18+	0.00	0.00	0.00	0.00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00
DP 18+	18 00	18 00	18.00	18 00	18 00	18.00	18 00	18 00	18 00	18 00	18.00	18 00	18 00	18 00	18.00	18 00	18 00	18 00	18 00

WEIGHT PERCENT X-MER VS DP
MW(FOH)= 214 00
PROBABILITIES ARE 0 17 0 23 0 16 0 44

DP	1 210	1 220	1 230	1 240	1 250	1.260	1.270	1 280	1 290	1 300	1 310	1 320	1 330	1 340	1 350	1 360	1 370	1 380	1 390
DP1/DP2	4 558	4 409	4 273	4 148	4 033	3 927	3 830	3 739	3 655	3 576	3 502	3 434	3 369	3 308	3 251	3 197	3 147	3 098	3.053
ALPHA	0 043	0 045	0 047	0 048	0 050	0 052	0 053	0 055	0 056	0 058	0 059	0 061	0 062	0 063	0 065	0 066	0 068	0 069	0 070
X-MER																			
1	76 73	75 88	75 05	74 24	73.44	72 67	71 90	71 16	70 42	69 71	69 01	68 32	67 64	66 98	66 33	65 69	65 07	64 45	63 85
2	16 83	17 21	17 57	17 90	18 21	18 50	18 78	19 03	19 27	19 49	19 70	19 90	20 08	20 24	20 40	20 54	20 68	20 80	20 91
3	4.52	4.78	5.03	5 28	5 53	5 77	6 00	6 23	6 45	6 67	6 88	7.09	7 29	7 48	7 67	7 86	8 03	8 21	8 37
4	1 32	1.45	1 57	1 70	1 83	1 96	2 09	2 22	2 36	2 49	2 62	2 75	2.89	3.02	3.15	3.28	3.41	3 53	3.66
5	0.41	0.46	0 52	0 57	0 63	0 70	0 76	0 83	0 90	0 97	1 05	1 12	1 20	1 27	1.35	1 43	1 51	1 59	1 67
6	0 13	0 15	0.17	0.20	0.23	0.26	0.29	0 32	0 35	0.39	0 43	0 47	0.51	0 55	0 60	0 64	0 69	0.74	0 79
7	0 04	0 05	0 06	0 07	0.08	0.10	0 11	0 13	0 14	0 16	0 18	0 20	0.22	0.25	0.27	0.30	0 32	0 35	0 38
8	0 01	0 02	0 02	0 03	0 03	0 04	0 04	0 05	0 06	0 07	0 08	0 09	0.10	0 11	0.12	0 14	0 15	0 17	0 18
9	0 00	0 01	0 01	0.01	0 01	0 01	0 02	0 02	0 02	0 03	0 03	0 04	0.04	0.05	0 06	0 06	0 07	0.08	0.09
10	0 00	0 00	0 00	0 00	0 00	0 01	0 01	0 01	0 01	0 01	0 01	0.02	0 02	0 02	0 03	0 03	0 03	0 04	0 04
11	0.00	0 00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0 01	0 01	0 01	0.01	0.01	0 01	0.01	0.02	0 02	0 02
12	0.00	0.00	0 00	0.00	0.00	0 00	0 00	0.00	0.00	0 00	0 00	0 00	0.00	0 00	0 01	0.01	0 01	0 01	0 01
13	0 00	0 00	0 00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0 00	0.00	0.00	0.00	0.01
14	0 00	0.00	0 00	0 00	0 00	0 00	0 00	0.00	0 00	0 00	0 00	0.00	0 00	0 00	0.00	0 00	0 00	0 00	0.00
15	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0.00	0.00	0 00	0.00	0 00	0 00	0 00	0 00
16	0 00	0 00	0.00	0.00	0.00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0.00	0 00	0.00	0.00	0.00	0 00	0 00
17	0 00	0.00	0 00	0 00	0.00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00
18+	0.00	0 00	0 00	0 00	0.00	0.00	0 00	0.00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00
DP 18+	18 00	18 00	18 00	18.00	18.00	18.00	18 00	18.00	18 00	18.00	18 00	18.00	18 00	18.00	18.00	18.00	18 00	18 00	18 00

WEIGHT PERCENT X-MER VS DP
MW(FOH)= 214 00
PROBABILITIES ARE 0 17 0.23 0 16 0.44

DP	1 400	1 410	1 420	1 430	1.440	1 450	1 460	1 470	1 480	1 490	1 500	1 510	1 520	1 530	1 540	1 550	1 560	1 570	1 580		
DP1/DP2	3 010	2 968	2.929	2 892	2 857	2 823	2 791	2 760	2 730	2 702	2 675	2.649	2.624	2 600	2 577	2 554	2 533	2 512	2 493		
ALPHA	0 071	0.073	0.074	0.075	0.076	0.078	0 079	0.080	0 081	0 082	0 083	0 084	0 086	0 087	0 088	0.089	0 090	0 091	0 092		
X-MER																					
1	63 26	62 68	62 11	61 54	60 99	60.45	59.92	59 40	58.89	58.38	57 89	57 40	56.92	56.45	55.98	55 53	55.08	54 64	54 20		
2	21 02	21 11	21.20	21.28	21 35	21 42	21 47	21 52	21.57	21.61	21.64	21.67	21 70	21 71	21 73	21 74	21.74	21 75	21.75		
3	8 54	8 69	8 85	8 99	9.13	9.27	9 40	9.53	9.65	9.77	9 88	9.99	10 10	10 20	10 30	10 39	10 48	10 57	10 65		
4	3 78	3.90	4.02	4 14	4 26	4.38	4.49	4 60	4 71	4 82	4 92	5 02	5 13	5 22	5 32	5 42	5 51	5 60	5.69		
5	1 76	1 84	1 92	2 00	2 08	2 16	2 25	2 33	2 41	2 49	2 57	2 65	2.73	2 80	2 88	2 96	3 03	3 11	3 18		
6	0 84	0 89	0 94	0 99	1 05	1 10	1 16	1 21	1 27	1 32	1 38	1 44	1.49	1.55	1 61	1.66	1 72	1 78	1 83		
7	0 41	0.44	0 47	0 50	0.54	0 57	0.61	0 64	0.68	0 72	0 75	0 79	0 83	0 87	0 91	0 95	0 99	1 03	1 08		
8	0 20	0 22	0.24	0.26	0 28	0 30	0 32	0.35	0 37	0 39	0 42	0 44	0 47	0 50	0 53	0 55	0 58	0.61	0 64		
9	0 10	0 11	0 12	0 13	0 15	0 16	0 17	0 19	0 20	0 22	0 23	0 25	0 27	0 29	0.31	0 32	0.34	0 36	0 38		
10	0 05	0 06	0 06	0 07	0 08	0 09	0 09	0 10	0.11	0 12	0.13	0 14	0 15	0 17	0.18	0 19	0.21	0 22	0.23		
11	0 03	0.03	0 03	0.04	0 04	0.05	0.05	0.06	0 06	0 07	0 08	0 08	0.09	0 10	0 11	0 11	0 12	0 13	0.14		
12	0 01	0 01	0 02	0 02	0 02	0 03	0.03	0.03	0.04	0.04	0 04	0.05	0.05	0 06	0 06	0 07	0 07	0 08	0 09		
13	0 01	0 01	0 01	0 01	0 01	0 01	0 02	0 02	0 02	0 02	0 02	0 03	0 03	0 03	0 04	0 04	0 05	0 05	0 05		
14	0 00	0 00	0 00	0 01	0 01	0 01	0 01	0 01	0 01	0 01	0.01	0.02	0.02	0 02	0 02	0 02	0 03	0.03	0.03		
15	0 00	0 00	0 00	0 00	0.00	0 00	0.00	0.01	0 01	0 01	0 01	0.01	0.01	0 01	0.01	0 01	0.02	0 07	0.02		
16	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0.00	0 00	0 01	0 01	0 01	0 01	0 01	0 01	0 01	0 01		
17	0 00	0 00	0 00	0 00	0.00	0 00	0 00	0.00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 01	0 01	0 01	0 01		
18+	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 01	0 01	0 01	0 01	0 01	0 01	0 01		
DP 18+	18 00	18 00	18 00	18 00	18 00	18 00	18 00	18 00	18 00	18 00	18 00	18 00	18 00	18 00	18 00	18 00	18 02	.8 14	18 59		

WEIGHT PERCENT X-MER VS DP
MW(FOH)= 214.00
PROBABILITIES ARE 0 17 0 23 0 16 0 44

DP	1 590	1.600	1.610	1 620	1 630	1.640	1.650	1 660	1 670	1.680	1 690	1 700	1 710	1 720	1 730	1 740	1 750	760	1.770		
DP1/DP2	2.473	2.455	2 437	2 420	2 403	2 387	2 371	2 356	2 342	2 328	2 314	2 301	2 288	2 275	2.263	2.251	2 240	2 229	2 218		
ALPHA	0 093	0 094	0 095	0 096	0 097	0 098	0 098	0.099	0 100	0 101	0 102	0.103	0.104	0.105	0 105	0.106	0 107	0 108	0 109		
X-MER																					
1	53.77	53.35	52.93	52.53	52 12	51 73	51 34	50.95	50 57	50 20	49 83	49 47	49 11	48 76	48.41	48 07	47 73	47.40	47 07		
2	21 74	21 73	21.72	21 71	21 69	21 67	21 65	21 62	21 60	21 57	21.54	21.50	21.47	21.43	21 39	21 35	21.31	21 27	21 23		
3	10 73	10 81	10 88	10 95	11 01	11 08	11 14	11.20	11.25	11 30	11.35	11 40	11 45	11 49	11.53	11.57	11.60	11 64	11 67		
4	5 77	5.86	5.94	6 02	6 10	6.17	6.25	6.32	6 39	6.46	6 53	6 59	6 65	6 71	6 77	6 83	6 89	6 94	6 99		
5	3 25	3 33	3.40	3 47	3 54	3 61	3 67	3 74	3 80	3 87	3 93	3 99	4 05	4 11	4.17	4.23	4.28	4 34	4.39		
6	1 89	1 94	2 00	2.06	2 11	2 17	2 22	2 27	2.33	2.38	2 43	2 49	2 54	2.59	2.64	2 69	2.74	2.79	2 84		
7	1 12	1.16	1.20	1.24	1.28	1.33	1 37	1.41	1 45	1.50	1.54	1 58	1.62	1 66	1 70	1.75	1 79	1 83	1 87		
8	0 67	0 70	0 73	0 76	0 79	0 82	0 86	0 89	0 92	0 95	0 98	1 02	1 05	1.08	1.12	1 15	1 18	1 22	1.25		
9	0 41	0 43	0 45	0 47	0 49	0 52	0 54	0 56	0.59	0 61	0 64	0 66	0 69	0 71	0.74	0 76	0.79	0 82	0 84		
10	0 25	0.26	0.28	0.29	0 31	0 33	0 34	0 36	0.38	0 40	0 42	0 43	0 45	0 47	0 49	0 51	0 53	0 55	0 57		
11	0.15	0 16	0 17	0 18	0.20	0 21	0 22	0 23	0 25	0 26	0 27	0 29	0 30	0.32	0 33	0 35	0.36	0 38	0 39		
12	0.09	0.10	0 11	0.12	0.12	0.13	0 14	0.15	0 16	0 17	0.18	0.19	0.20	0 21	0.22	0.23	0 25	0 26	0 27		
13	0 06	0 06	0.07	0 07	0 08	0 09	0 09	0.10	0 11	0 11	0 12	0 13	0 13	0 14	0 15	0 16	0 17	0.18	0 19		
14	0 04	0 04	0 04	0 05	0 05	0 06	0 06	0.06	0 07	0 07	0.08	0 08	0.09	0.10	0 10	0.11	0.12	0 12	0 13		
15	0.02	0 02	0 03	0 03	0 03	0 04	0 04	0 04	0 05	0 05	0 05	0 06	0 06	0 07	0 07	0 07	0 08	0 08	0 09		
16	0 01	0 02	0 02	0 02	0 02	0 02	0 03	0 03	0 03	0 03	0 04	0 04	0 04	0 04	0 05	0 05	0 05	0 06	0 06		
17	0 01	0 01	0 01	0 01	0 01	0.02	0 02	0.02	0 02	0.02	0 02	0 03	0 03	0 03	0 03	0.04	0.04	0 04	0 04		
18+	0 02	0 02	0 02	0 02	0 03	0 03	0 03	0.04	0 04	0 04	0 05	0 05	0 06	0 07	0 07	0 08	0.09	0 10	0 10		
DP 18+	18 55	18.56	18.84	18 89	18 80	19 07	19 22	19 24	19 31	19 44	19 51	19 60	19 61	19 63	19 75	19 74	19.81	19.85	19 93		

WEIGHT PERCENT X-MER VS DP
MW(FOR)= 214 00
PROBABILITIES ARE 0 17 0 23 0 16 0 44

DP	1 780	1 790	1 800	1 810	1 820	1 830	1 840	1 850	1 860	1 870	1 880	1 890	1 900	1 910	1 920	1 930	1 940	1 950	1 960
DP1/DP2	2 207	2 197	2 187	2 177	2 168	2 158	2 149	2 141	2 132	2 124	2 116	2 109	2 100	2.092	2 085	2 078	2 071	2 064	2 057
ALPHA	0 110	0 110	0 111	0 112	0 113	0 113	0 114	0 115	0 116	0 116	0 117	0 118	0 118	0 119	0 120	0 120	0 121	0 122	0 122
X-MER																			
1	46 75	46 43	46 11	45 80	45.50	45 19	44 90	44 60	44 31	44 02	43 74	43 46	43 19	42 91	42 64	42 38	42 12	41 86	41 60
2	21 18	21 13	21 09	21 04	20.99	20 94	20 89	20 84	20 78	20 73	20 67	20 62	20 56	20 51	20 45	20 39	20 34	20 28	20 22
3	11 70	11 73	11 75	11 78	11 80	11 82	11 84	11 86	11 88	11 89	11 91	11.92	11 93	11 94	11 95	11 96	11 96	11 97	11 97
4	7 05	7 10	7 14	7 19	7.23	7 28	7 32	7 36	7 40	7.44	7 48	7 51	7 54	7 58	7 61	7 64	7 67	7 70	7 73
5	4 44	4 50	4 55	4 60	4 65	4 69	4 74	4 79	4 83	4 87	4 92	4 96	5 00	5 04	5.08	5 11	5 15	5 19	5 22
6	2 89	2.93	2 98	3.02	3 07	3 11	3 16	3 20	3 24	3 29	3 33	3 37	3 41	3 45	3 48	3 52	3 56	3 60	3 63
7	1 91	1 95	1 99	2 03	2 07	2 11	2 14	2 18	2 22	2 26	2 29	2 33	2 37	2 40	2 44	2 47	2 51	2 54	2 58
8	1 28	1 31	1 35	1 38	1 41	1 44	1 48	1 51	1 54	1 57	1 61	1 64	1 67	1 70	1 73	1 76	1 79	1 82	1 85
9	0 87	0 89	0 92	0 95	0 97	1 00	1 03	1 05	1 08	1 11	1 13	1 16	1 19	1 21	1 24	1 27	1 29	1 32	1 34
10	0 59	0 61	0 64	0 66	0 68	0 70	0 72	0.74	0 76	0 79	0 81	0 83	0 85	0 87	0 90	0 92	0 94	0 96	0 98
11	0 41	0.42	0 44	0 46	0 47	0 49	0 5.	0 53	0 54	0 56	0 58	0 60	0 62	0 63	0 65	0 67	0 69	0 71	0 73
12	0 28	0 29	0 31	0 32	0 33	0 35	0 36	0 37	0 39	0 40	0 42	0 43	0 45	0 46	0 48	0 49	0 51	0 52	0 54
13	0 20	0 21	0 22	0 23	0 24	0 25	0 26	0 27	0 28	0 29	0 30	0 31	0 33	0 34	0 35	0 36	0 37	0 39	0 40
14	0 14	0 14	0 15	0 16	0 17	0 18	0 18	0 19	0 20	0 21	0 22	0 23	0 24	0 25	0 26	0 27	0 28	0 29	0 30
15	0.10	0 10	0.11	0 11	0 12	0 13	0 13	0.14	0 15	0 15	0 16	0 17	0 17	0 18	0 19	0 20	0 21	0 21	0 22
16	0 07	0 07	0 08	0 08	0 08	0 09	0 09	0 10	0 11	0 11	0 12	0 12	0 13	0 13	0 14	0 15	0 15	0 16	0 17
17	0 05	0 05	0 05	0 06	0 06	0 06	0 07	0 07	0 08	0 08	0 09	0 09	0 09	0 10	0 10	0 11	0 12	0 12	0 13
18+	0.11	0 12	0 13	0 14	0 16	0 17	0 18	0 19	0 21	0 22	0 24	0 26	0 27	0 29	0 31	0 33	0 35	0 37	0 39
DP 18+	19 99	20 01	20 05	20 11	20 15	20 18	20 20	20 23	20 30	20 33	20 37	20 41	20 46	20 47	20 52	20.55	20 58	20 64	20 67

WEIGHT PERCENT X-MER VS DP
MW(FOR)= 214 00
PROBABILITIES ARE 0 17 0 23 0 16 0 44

DP	. 970	1 980	1 990	2.000	2.010	2 020	2 030	2 040	2 050	2 060	2 070	2 080	2 090	2 100	2 110	2 120	2 130	2 140	2 150
DP1/DP2	2 051	2 044	2 038	2 032	2 026	2 020	2 014	2 009	2 003	1.998	1.992	1 987	1 982	1 977	1 972	1.967	1 963	1 958	1 954
ALPHA	0 123	0 124	0 124	0 125	0 126	0 126	0 127	0 127	0 128	0 129	0 129	0 130	0 130	0 131	0 132	0 132	0 133	0 133	0 134
X-MER																			
1	41 35	41 10	40 85	40 61	40 36	40 13	39 89	39 66	39 43	39 20	38 98	38 76	38 54	38 32	38 10	37 89	37 68	37 47	37 27
2	20 16	20 10	20 04	19 99	19 93	19 87	19 8.	19 75	19 68	19 62	19 56	19 50	19 44	19 38	19 32	19 26	19 20	19 14	19 08
3	11 97	11 98	11 98	11 98	11 98	11 97	11 97	11 97	11 96	11 96	11 95	11 95	11 94	11 93	11 92	11 91	11 90	11 89	11 88
4	7 75	7 78	7 80	7 82	7 85	7 87	7 89	7 91	7 93	7 94	7 96	7 98	7 99	8 01	8 02	8 03	8 04	8 06	8 07
5	5.26	5 29	5 32	5 35	5 38	5 41	5 44	5 47	5 50	5 53	5 55	5 58	5 60	5 63	5 65	5 67	5 69	5 72	5 74
6	3 67	3 70	3 74	3 77	3 80	3 83	3 87	3 90	3 93	3 96	3 99	4 01	4 04	4 07	4.10	4.12	4 15	4 17	4 20
7	2 61	2 64	2 67	2 71	2.74	2 77	2 80	2 83	2 86	2 89	2 92	2 94	2 97	3 00	3 03	3 05	3 08	3 10	3 13
8	1 88	1 91	1 94	1 97	2 00	2 03	2 05	2 08	2 11	2 14	2 16	2 19	2 22	2 74	2 27	2 29	2 32	2 34	2 37
9	1.37	1 40	1 42	1 45	1 47	1 50	1 52	1 55	1 57	1 60	1 62	1 65	1 67	1 69	1 72	1 74	1 76	1 79	1 81
10	1 01	1 03	1 05	1 07	1 09	1 12	1 14	1 16	1 18	1 20	1 22	1 25	1 27	1 29	1 31	1 33	1 35	1 37	1 39
11	0 74	0 76	0 78	0 80	0 82	0 84	0 86	0 88	0 89	0 91	0 93	0 95	0 97	0 99	1 01	1 02	1 04	1 06	1 08
12	0 55	0 57	0 58	0 60	0 62	0 63	0 65	0 66	0 68	0 70	0 71	0 73	0 74	0 76	0 78	0 79	0 81	0 82	0 84
13	0 42	0 43	0 44	0 45	0 46	0 48	0 49	0 51	0 52	0 53	0 55	0 56	0 57	0 59	0 60	0 62	0 63	0 64	0 66
14	0 31	0 32	0 33	0 34	0 35	0 36	0 37	0 39	0 40	0 41	0 42	0 43	0 44	0 46	0 47	0 48	0 49	0 50	0 52
15	0 23	0 24	0 25	0 26	0.27	0 28	0 29	0 30	0 31	0 32	0 32	0 33	0 34	0 35	0 37	0 38	0 39	0 40	0 41
16	0 17	0 18	0 19	0 20	0 20	0 21	0 22	0 23	0 24	0 24	0 25	0 26	0 27	0 28	0 29	0 29	0 30	0 31	0 32
17	0 13	0 14	0 14	0 15	0 16	0 16	0 17	0 18	0 18	0 19	0 20	0 20	0 21	0.22	0 22	0 23	0 24	0 25	0 25
18+	0 42	0 44	0.47	0.49	0 52	0 55	0 58	0 61	0 64	0 67	0 70	0 73	0 77	0 80	0 84	0 88	0 92	0 96	1.00
DP 18+	20 71	20.73	20 76	20 80	20 83	20 87	20 90	20 94	20 98	21 02	21 05	21 09	21.12	21 16	21 19	21 22	21 26	21 29	21 33

WEIGHT PERCENT X-MER VS DP
MW(FOH)= 242 00
PROBABILITIES ARE 0 17 0 23 0 16 0 44

DP	1 020	1 030	1 040	1 050	1 060	1 070	1 080	1 090	1 100	1 110	1 120	1 130	1 140	1 150	1 160	1 170	1 180	1 190	1 200		
DP1/DP236	90025	00919.06	415.49	813.12	111.42	410.152	9.163	8.372	7 725	7.187	6 731	6 341	6 003	5 708	5 448	5 216	5.010	4 824			
ALPHA	0.005	0 007	0 010	0 012	0.014	0.016	0.019	0 021	0 023	0 025	0 027	0 029	0 031	0 033	0 034	0 036	0 038	0 040	0 042		
X-MER																					
1	97 27	95.96	94.69	93.44	92.23	91 05	89.90	88 77	87 68	86 61	85 56	84 54	83 55	82 57	81.62	80 69	79 78	78.89	78 02		
2	2 64	3 84	4 97	6.03	7 03	7 97	8 86	9 69	10 47	11.21	11.91	12.56	13.17	13 75	14 30	14 81	15.29	15.75	16 17		
3	0 09	0 19	0.32	0.48	0.66	0 86	1 08	1 31	1.55	1 80	2.05	2 31	2.57	2 83	3 10	3 36	3 63	3 89	4 15		
4	0.00	0 01	0 02	0.04	0 07	0 10	0 14	0 19	0.25	0.32	0.39	0.46	0.55	0.64	0 74	0 84	0.94	1 05	1 16		
5	0 00	0.00	0.00	0.00	0.01	0.01	0 02	0 03	0 04	0.06	0 08	0 10	0 12	0 15	0 18	0 22	0 26	0 30	0 34		
6	0 00	0 00	0.00	0 00	0 00	0.00	0.00	0 00	0.01	0 01	0 02	0 02	0.03	0 04	0 05	0.06	0 07	0 09	0 10		
7	0 00	0 00	0 00	0 00	0.00	0 00	0 00	0 00	0 00	0 00	0 00	0.00	0 01	0 01	0 01	0 02	0 02	0 03	0 03		
8	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0.00	0.00	0 00	0 00	0 01	0.01	0 01		
9	0 00	0 00	0.00	0 00	0 00	0 00	0 00	0 00	0 00	0.00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00		
10	0 00	0 00	0 00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0 00	0 00	0.00	0 00	0 00	0.00	0 00	0.00	0 00		
11	0.00	0 00	0 00	0 00	0 00	0 00	0.00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00		
12	0 00	0 00	0.00	0.00	0.00	0.00	0 00	0 00	0.00	0.00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00		
13	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0.00	0 00	0.00		
14	0.00	0 00	0.00	0 00	0.00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00		
15	0 00	0 00	0.00	0.00	0 00	0 00	0.00	0 00	0 00	0 00	0.00	0.00	0.00	0.00	0 00	0 00	0.00	0.00	0.00		
16	0 00	0.00	0.00	0.00	0.00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00		
17	0 00	0 00	0.00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0.00	0 00	0 00	0 00	0 00	0 00		
18+	0.00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00		
DP 18+	18 00	18 00	18 00	18 00	18 00	18 00	18 00	18 00	18.00	18 00	18 00	18.00	18.00	18.00	18 00	18 00	18 00	18 00	18.00		

WEIGHT PERCENT X-MER VS DP
MW(FOH)= 242 00
PROBABILITIES ARE 0 17 0 23 0 16 0 44

DP	1 210	1 220	1.230	1 240	1 250	1 260	1 270	1 280	1 290	1 300	1 310	1 320	1 330	1 340	1 350	1.360	1 370	1 380	1 390		
DP1/DP2	4 655	4.503	4 364	4.236	4 119	4 011	3 911	3 819	3 732	3 652	3.577	3.507	3 441	3.379	3 321	3.266	3 214	3 164	3.118		
ALPHA	0 043	0 045	0 047	0 048	0 050	0 052	0 053	0 055	0 056	0 058	0 059	0 061	0 062	0.063	0.065	0.066	0 068	0 069	0.070		
X-MER																					
1	77.17	76 34	75 52	74 72	73 94	73 18	72 43	71.69	70 97	70 27	69 57	68 89	68 23	67 58	66.94	66 31	65.69	65.09	64 49		
2	16 58	16.95	17 31	17.64	17 95	18 24	18 52	18 77	19 01	19 24	19 45	19 65	19 83	20 00	20 16	20 30	20 44	20 57	20 68		
3	4 40	4 65	4 90	5 15	5 39	5 62	5 85	6 07	6 29	6 51	6.72	6 92	7 12	7 31	7.49	7 68	7.85	8.07	8 19		
4	1.28	1.40	1.52	1.64	1 77	1 90	2.02	2 15	2 28	2 41	2 54	2 67	2 80	2 93	3 05	3 18	3 30	3 43	3 55		
5	0 39	0.44	0 50	0 55	0 61	0 67	0 74	0 80	0.87	0.94	1 01	1 08	1 15	1 23	1.31	1 38	1 46	1 54	1 62		
6	0 12	0.14	0 17	0 19	0 22	0 25	0 28	0 31	0 34	0 38	0 41	0 45	0 49	0 53	0 58	0 62	0 66	0.71	0 76		
7	0 04	0 05	0.06	0.07	0.08	0 09	0.11	0 12	0 14	0 15	0 17	0 19	0 21	0 24	0 26	0 28	0 31	0 34	0 36		
8	0.01	0 02	0 02	0 02	0 03	0 03	0 04	0 05	0 06	0 06	0 07	0.08	0 09	0.11	0 12	0 13	0 15	0 16	0.18		
9	0 00	0 01	0.01	0 01	0 01	0 01	0 02	0 02	0 02	0 03	0.03	0 04	0 04	0 05	0 05	0 06	0 07	0 08	0 09		
10	0 00	0 00	0.00	0.00	0 00	0 01	0.01	0 01	0 01	0 01	0 01	0 02	0 02	0 02	0.03	0 03	0 03	0 04	0 04		
11	0 00	0.00	0.00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 01	0 01	0 01	0 01	0.01	0 01	0 02	0 02	0.02		
12	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 01	0 01	0.01	0 01	0 01		
13	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0.00	0 00	0 00	0.00	0 00	0.00	0.00	0 00	0 00	0 00	0 01		
14	0.00	0.00	0 00	0 00	0 00	0 00	0 00	0 00	0.00	0 00	0.00	0 00	0 00	0 00	0 00	0 00	0 00	0.00	0 00		
15	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00		
16	0.00	0.00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0.00	0.00	0.00	0 00	0 00	0.00	0 00	0 00	0 00		
17	0.00	0 00	0.00	0.00	0 00	0.00	0 00	0 00	0 00	0 00	0.00	0.00	0 00	0.00	0.00	0 00	0 00	0 00	0 00		
18+	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00		
DP 18+	18 00	18.00	18.00	18 00	18.00	18 00	18.00	18.00	18.00	18 00	18 00	18 00	18 00	18 00	18 00	18 00	18 00	18 00	18 00		

WEIGHT PERCENT X-MER VS DP
MW(FOH)= 242 00
PROBABILITIES ARE 0 17 0 23 0 16 0 44

DP	1 400	1 410	1 420	1 430	1.440	1 450	1 460	1 470	1.480	1.490	1 500	1 510	1 520	1 530	1 540	1 550	1 560	1 570	1 580	
DP1/DP2	3 074	3 032	2 992	2 954	2 918	2 883	2 850	2 818	2 788	2 759	2 732	2 705	2 680	2 655	2 631	2.609	2 587	2 566	2 546	
ALPHA	0 071	0.073	0.074	0.075	0 076	0 078	0.079	0 080	0.081	0 082	0 083	0 084	0 086	0 087	0 088	0 089	0 090	0 091	0 092	
X-MER																				
1	63 91	63 33	62 77	62 22	61 68	61 14	60 62	60 10	59 60	59 10	58 61	58.12	57.65	57 18	56.73	56.27	55.83	55 39	54.96	
2	20 79	20 89	20 98	21 06	21.14	21.21	21 27	21 32	21.37	21.42	21.45	21.49	21 52	21.54	21 56	21.57	21 58	21 59	21 59	
3	8 35	8 50	8 65	8.80	8.94	9.07	9 21	9 33	9.45	9 57	9 69	9 79	9 90	10 00	10 10	10 19	10.28	10 37	10.45	
4	3 67	3.79	3 91	4 03	4 14	4 25	4 36	4 47	4 58	4 69	4 79	4 89	4.99	5 09	5 18	5 27	5.37	5 45	5 54	
5	1 70	1 77	1 85	1 93	2 01	2 09	2 17	2 25	2 33	2 41	2.49	2.56	2 64	2 72	2 79	2.87	2.94	3.01	3 09	
6	0 81	0 86	0 91	0 96	1 01	1 06	1.11	1 17	1 22	1 28	1 33	1.38	1.44	1.49	1.55	1 60	1 66	1 71	1 77	
7	0 39	0 42	0 45	0 48	0.52	0 55	0 58	0 62	0 65	0.69	0 73	0 76	0 80	0 84	0 88	0 92	0 96	1 00	1 04	
8	0.19	0 21	0 23	0 25	0 27	0 29	0 31	0.33	0 35	0 38	0 40	0 43	0 45	0 48	0 50	0 53	0 56	0 59	0 62	
9	0 10	0 11	0 12	0 13	0 14	0 15	0 17	0 18	0 19	0.21	0 22	0 24	0.26	0 28	0 29	0 31	0.33	0 35	0 37	
10	0 05	0 05	0 06	0 07	0 07	0.08	0.09	0.10	0.11	0 12	0 13	0.14	0 15	0 16	0 17	0 18	0 20	0 21	0 22	
11	0 02	0 03	0 03	0 04	0 04	0 04	0.05	0 05	0 06	0.07	0 07	0.08	0 09	0 09	0 10	0 11	0 12	0 13	0 14	
12	0 01	0 01	0 02	0 02	0 02	0 02	0.03	0 03	0 03	0 04	0 04	0 05	0.05	0 05	0 06	0 07	0 07	0 08	0 08	
13	0 01	0 01	0 01	0 01	0 01	0 01	0 01	0 02	0 02	0 02	0 02	0.03	0.03	0.03	0.04	0 04	0 04	0 05	0 05	
14	0 00	0 00	0.00	0 01	0 01	0 01	0 01	0.01	0.01	0.01	0.01	0.02	0.02	0.02	0.02	0 02	0 03	0 03	0 03	
15	0 00	0.00	0.00	0.00	0.00	0 00	0 00	0 01	0 01	0 01	0 01	0 01	0 01	0 01	0 01	0 01	0 02	0 02	0 02	
16	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 01	0 01	0 01	0 01	0 01	0 01	0 01	0 01	
17	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0.00	0 00	0 00	0.01	0.01	0 01	0 01	
18+	0 00	0 00	0.00	0.00	0 00	0 00	0 00	0 00	0 00	0.00	0 00	0 00	0 01	0 01	0 01	0 01	0 01	0 01	0 01	
DP 18+	18 00	18 00	18 00	18 00	18.00	18.00	18.00	18 00	18 00	18 00	18 00	18 00	18 00	18 00	18 00	18 00	18 02	18 14	18 59	

WEIGHT PERCENT X-MER VS DP
MW(FOH)= 242 00
PROBABILITIES ARE 0 17 0 23 0 16 0 44

DP	1 590	1 600	1 610	1 620	1 630	1 640	1 650	1 660	1 670	1 680	1.690	1 700	1.710	1.720	1.730	1.740	1 750	1 760	1 770	
DP1/DP2	2.526	2 507	2.489	2 471	2.454	2 438	2 422	2 407	2 392	2 377	2.363	2 350	2.336	2 324	2 311	2 299	2 287	2 276	2 265	
ALPHA	0 093	0 094	0 095	0 096	0 097	0.098	0 098	0 099	0.100	0 101	0.102	0 103	0 104	0 105	0 105	0 106	0.107	0 108	0 109	
X-MER																				
1	54.54	54.12	53 71	53.31	52 91	52 51	52 13	51 75	51 37	51 00	50 64	50 28	49 92	49 57	49 23	48 89	48 56	48.23	47.90	
2	21.59	21 59	21 58	21 57	21 56	21 54	21 52	21 50	21 48	21 45	21 43	21 40	21.37	21.33	21 30	21 26	21.23	21.19	21 15	
3	10 53	10 61	10 68	10 75	10 82	10 89	10.95	11 01	11.06	11 12	11.17	11.22	11 26	11 31	11 35	11.39	11.42	11 46	11 49	
4	5 63	5 71	5 79	5.87	5 95	6 02	6 10	6 17	6.24	6.31	6.37	6 44	6 50	6 56	6 62	6 68	6 73	6 79	6 84	
5	3 16	3.23	3 30	3 37	3.43	3.50	3.57	3 63	3 69	3 76	3 82	3 88	3 94	4 00	4 05	4 11	4 17	4 22	4 27	
6	1 82	1 88	1 93	1 99	2 04	2 10	2 15	2.20	2 25	2 31	2 36	2 41	2 46	2 51	2 56	2 61	2 66	2 70	2 75	
7	1 08	1 12	1 16	1 20	1 24	1 28	1 32	1 36	1 40	1 44	1.48	1 53	1.57	1 61	1 65	1 69	1.73	1.77	1 81	
8	0 64	0 67	0.70	0.73	0 76	0.79	0 82	0 85	0.89	0 92	0.95	0 98	1 01	1 04	1 08	1 11	1 14	1 17	1 20	
9	0.39	0 41	0 43	0 45	0.47	0 50	0 52	0 54	0 57	0 59	0 61	0 64	0 66	0 69	0 71	0 74	0 76	0 79	0.81	
10	0 24	0.25	0 27	0 28	0 30	0 31	0 33	0 35	0 36	0 38	0 40	0.42	0.44	0 45	0 47	0 49	0.51	0 53	0.55	
11	0.15	0 16	0 17	0 18	0.19	0 20	0.21	0.22	0.24	0.25	0.26	0.27	0.29	0.30	0 32	0.33	0.35	0 36	0 38	
12	0.09	0.10	0 10	0.11	0.12	0.13	0 14	0.14	0 15	0.16	0.17	0 18	0 19	0 20	0 21	0 22	0 24	0 25	0.26	
13	0 06	0 06	0.07	0 07	0 08	0.08	0 09	0 09	0 10	0 11	0 11	0 12	0 13	0 14	0 14	0 15	0 16	0 17	0 18	
14	0 03	0.04	0 04	0 04	0 05	0 05	0 06	0 06	0 07	0 07	0.08	0 08	0 09	0 09	0 10	0 10	0 11	0.12	0 12	
15	0 02	0 02	0 03	0 03	0 03	0 03	0 04	0.04	0.04	0.05	0.05	0 05	0.06	0.06	0 07	0.07	0 08	0 08	0 09	
16	0 01	0.02	0.02	0.02	0.02	0.02	0 02	0 03	0 03	0 03	0 03	0.04	0 04	0 04	0 05	0 05	0 05	0 06	0 06	
17	0 01	0 01	0 01	0 01	0 01	0 01	0 02	0.02	0 02	0 02	0 02	0.02	0.03	0.03	0 03	0.03	0 04	0 04	0.04	
18+	0 01	0 02	0 02	0 02	0 02	0 03	0 03	0.03	0 04	0 04	0 05	0 05	0 06	0 06	0.07	0 08	0 08	0 09	0 10	
DP 18+	18 55	18 56	18 84	18.89	18.80	19 07	19 22	19 24	19 31	19 44	19.51	19 60	19 61	19 63	19 75	19 74	19 81	19 85	19 93	

WEIGHT PERCENT X-MER VS DP
MW(FOH)= 242.00
PROBABILITIES ARE 0.17 0.23 0.16 0.44

DP	1.780	1.790	1.800	1.810	1.820	1.830	1.840	1.850	1.860	1.870	1.880	1.890	1.900	1.910	1.920	1.930	1.940	1.950	1.960
DP1/DP2	2.254	2.244	2.233	2.224	2.214	2.204	2.195	2.186	2.178	2.169	2.161	2.153	2.145	2.137	2.130	2.122	2.115	2.108	2.101
ALPHA	0.110	0.110	0.111	0.112	0.113	0.113	0.114	0.115	0.116	0.115	0.117	0.118	0.118	0.119	0.120	0.120	0.121	0.122	0.122
X-MER																			
1	47.58	47.26	46.95	46.64	46.34	46.04	45.74	45.45	45.16	44.87	44.59	44.31	44.04	43.77	43.50	43.23	42.97	42.72	42.46
2	21.11	21.06	21.02	20.98	20.93	20.88	20.84	20.79	20.74	20.69	20.64	20.58	20.53	20.48	20.43	20.37	20.32	20.26	20.21
3	11.53	11.56	11.58	11.61	11.63	11.66	11.68	11.70	11.72	11.73	11.75	11.76	11.78	11.79	11.80	11.81	11.81	11.82	11.83
4	6.89	6.94	6.99	7.03	7.08	7.12	7.17	7.21	7.25	7.29	7.32	7.36	7.39	7.43	7.46	7.49	7.52	7.55	7.58
5	4.33	4.38	4.43	4.48	4.52	4.57	4.62	4.66	4.71	4.75	4.79	4.83	4.87	4.91	4.95	4.99	5.03	5.06	5.10
6	2.80	2.84	2.89	2.93	2.98	3.02	3.06	3.11	3.15	3.19	3.23	3.27	3.31	3.35	3.39	3.42	3.46	3.50	3.53
7	1.85	1.89	1.92	1.96	2.00	2.04	2.08	2.11	2.15	2.19	2.22	2.26	2.29	2.33	2.36	2.40	2.43	2.46	2.50
8	1.24	1.27	1.30	1.33	1.36	1.39	1.43	1.46	1.49	1.52	1.55	1.58	1.61	1.64	1.67	1.70	1.73	1.76	1.79
9	0.84	0.86	0.89	0.91	0.94	0.96	0.99	1.02	1.04	1.07	1.09	1.12	1.15	1.17	1.20	1.22	1.25	1.27	1.30
10	0.57	0.59	0.61	0.63	0.65	0.67	0.69	0.71	0.74	0.76	0.78	0.80	0.82	0.84	0.86	0.89	0.91	0.93	0.95
11	0.39	0.41	0.42	0.44	0.46	0.47	0.49	0.51	0.52	0.54	0.56	0.57	0.59	0.61	0.63	0.65	0.66	0.68	0.70
12	0.27	0.28	0.30	0.31	0.32	0.33	0.35	0.36	0.37	0.39	0.40	0.42	0.43	0.44	0.46	0.47	0.49	0.50	0.52
13	0.19	0.20	0.21	0.22	0.23	0.24	0.25	0.26	0.27	0.28	0.29	0.30	0.31	0.32	0.34	0.35	0.36	0.37	0.38
14	0.13	0.14	0.15	0.15	0.16	0.17	0.18	0.18	0.19	0.20	0.21	0.22	0.23	0.24	0.25	0.26	0.27	0.28	0.29
15	0.09	0.10	0.10	0.11	0.11	0.12	0.13	0.13	0.14	0.15	0.15	0.16	0.17	0.17	0.18	0.19	0.20	0.21	0.21
16	0.06	0.07	0.07	0.08	0.08	0.09	0.09	0.10	0.10	0.11	0.11	0.12	0.12	0.13	0.14	0.14	0.15	0.15	0.16
17	0.04	0.05	0.05	0.05	0.06	0.06	0.07	0.07	0.07	0.08	0.08	0.09	0.09	0.10	0.10	0.11	0.11	0.12	0.12
18+	0.11	0.12	0.13	0.14	0.15	0.16	0.17	0.19	0.20	0.21	0.23	0.24	0.26	0.28	0.30	0.32	0.33	0.36	0.38
DP 18+	19.99	20.01	20.05	20.11	20.15	20.18	20.20	20.23	20.30	20.33	20.37	20.41	20.46	20.47	20.52	20.55	20.58	20.64	20.67

WEIGHT PERCENT X-MER VS DP
MW(FOH)= 242.00
PROBABILITIES ARE 0.17 0.23 0.16 0.44

DP	1.970	1.980	1.990	2.000	2.010	2.020	2.030	2.040	2.050	2.060	2.070	2.080	2.090	2.100	2.110	2.120	2.130	2.140	2.150
DP1/DP2	2.094	2.088	2.081	2.075	2.069	2.063	2.057	2.051	2.046	2.040	2.035	2.029	2.024	2.019	2.014	2.009	2.005	2.000	1.995
ALPHA	0.123	0.124	0.124	0.125	0.126	0.126	0.127	0.127	0.128	0.129	0.129	0.130	0.130	0.131	0.132	0.132	0.133	0.133	0.134
X-MER																			
1	42.71	41.96	41.71	41.47	41.23	40.99	40.76	40.53	40.30	40.07	39.85	39.63	39.41	39.19	38.98	38.77	38.56	38.35	38.14
2	20.15	20.10	20.04	19.99	19.93	19.87	19.81	19.76	19.70	19.64	19.58	19.53	19.47	19.41	19.35	19.29	19.23	19.18	19.12
3	11.83	11.84	11.84	11.84	11.84	11.84	11.84	11.84	11.84	11.83	11.83	11.82	11.82	11.81	11.81	11.80	11.79	11.78	11.77
4	7.60	7.63	7.65	7.68	7.70	7.72	7.74	7.76	7.78	7.80	7.82	7.84	7.85	7.87	7.88	7.90	7.91	7.92	7.93
5	5.13	5.16	5.20	5.23	5.26	5.29	5.32	5.35	5.37	5.40	5.43	5.45	5.48	5.50	5.53	5.55	5.57	5.59	5.61
6	3.57	3.60	3.63	3.67	3.70	3.73	3.76	3.79	3.82	3.85	3.88	3.91	3.94	3.96	3.99	4.02	4.04	4.07	4.09
7	2.53	2.56	2.59	2.63	2.66	2.69	2.72	2.75	2.78	2.80	2.83	2.86	2.89	2.91	2.94	2.97	2.99	3.02	3.04
8	1.82	1.85	1.88	1.91	1.93	1.96	1.99	2.02	2.04	2.07	2.10	2.12	2.15	2.17	2.20	2.22	2.25	2.27	2.30
9	1.32	1.35	1.37	1.40	1.42	1.45	1.47	1.50	1.52	1.54	1.57	1.59	1.62	1.64	1.66	1.68	1.71	1.73	1.75
10	0.97	0.99	1.01	1.04	1.06	1.08	1.10	1.12	1.14	1.16	1.18	1.20	1.22	1.25	1.27	1.29	1.31	1.33	1.35
11	0.72	0.73	0.75	0.77	0.79	0.81	0.83	0.84	0.86	0.88	0.90	0.92	0.93	0.95	0.97	0.99	1.01	1.02	1.04
12	0.53	0.55	0.56	0.58	0.59	0.61	0.62	0.64	0.65	0.67	0.69	0.70	0.72	0.73	0.75	0.75	0.78	0.80	0.81
13	0.40	0.41	0.42	0.43	0.45	0.46	0.47	0.49	0.50	0.51	0.53	0.54	0.55	0.57	0.58	0.59	0.61	0.62	0.63
14	0.30	0.31	0.32	0.33	0.34	0.35	0.36	0.37	0.38	0.39	0.40	0.42	0.43	0.44	0.45	0.46	0.47	0.49	0.50
15	0.22	0.23	0.24	0.25	0.26	0.27	0.28	0.28	0.29	0.30	0.31	0.32	0.33	0.34	0.35	0.36	0.37	0.38	0.39
16	0.17	0.17	0.18	0.19	0.20	0.20	0.21	0.22	0.23	0.23	0.24	0.25	0.26	0.27	0.27	0.28	0.29	0.30	0.31
17	0.13	0.13	0.14	0.14	0.15	0.16	0.16	0.17	0.17	0.18	0.19	0.19	0.20	0.21	0.22	0.22	0.23	0.24	0.24
18+	0.40	0.42	0.45	0.47	0.50	0.52	0.55	0.58	0.61	0.64	0.67	0.70	0.74	0.77	0.81	0.84	0.88	0.92	0.96
DP 18+	20.71	20.73	20.76	20.80	20.83	20.87	20.90	20.94	20.98	21.02	21.05	21.09	21.12	21.16	21.19	21.22	21.26	21.29	21.33

SUBMISSION END

Reference List for Industry Submission, GRN 000237

Pages	*Author*	*Title*	*Publish Date*	*Publisher*	*BIB_Info*
000048 - 000053	Flory, Paul J.	Molecular Size Distribution in Three Dimensional Polymers. V. Branced Polymers Containing A-R-B, Type Units	June 5, 1962	Journal Of The American Chemical Society	Volume 74, pgs 3718-3723

NA- Not applicable

AM

Ricker, Karin

From: Stanley Tarka [tarkagroup@comcast.net]
Sent: Monday, April 28, 2008 10:01 PM
To: Ricker, Karin
Cc: Gaynor, Paulette M
Subject: RE: GRN237 Information Requested - IXOS CFSAN 979 KB
Importance: High
Attachments: placeholder.tmp

Dear Dr. Ricker,
As promised, I am pleased to provide all of the information requested regarding Cognis Corporation's GRAS Notification 237. I apologize for the delay but just received the results this afternoon from analytical testing of multiple lots that confirm the lead level is less than 1 ppm.

Responses to all questions raised have been addressed in the following attachments:
1. Letter Responding to Outstanding Questions -outlines detailed responses to all questions raised including concurrence with FSIS on suitability for proposed use. Detailed information is described in the attached providing supportive information for each response including:
2. APG Legal Opinion demonstrating why it is exempt from FDAAA Section 912
3. Revised APG Specifications to be inserted in document reflecting a lead specification of <1ppm
4. Lead Testing Results- demonstrating from analysis of 6 non-consecutive lots that a product conforming to the specifications for lead of <1ppm can be consistently produced.

Thanks again for your patience and please confirm receipt of this information electronically and whether you require hard copies.

We trust that this has satisfactorily addressed all remaining questions and we look forward to the completion of FDA's review.

Kind Regards.

Sincerely,

Stanley Tarka

Stanley M. Tarka, Jr. Ph.D.
Senior Consultant
EAS Consulting Group
Ph: 717-243-9216
Fax: 702-993-5458
Email: Tarkagroup@comcast.net

EAS
CONSULTING GROUP

April 29, 2008

Karin Ricker, Ph.D.
Consumer Safety Officer
Office of Food Additive Safety
Center for Food Safety & Applied Nutrition
FDA
College Park, MD 20740

Dear Dr. Ricker:

This letter is in response to a number of points we have discussed relative to GRAS Notice 237, Alkyl Polyglycosides. I will address each point that we discussed and will be happy to respond to any questions.

Point #1: Question Regarding Applicability of Section 912 of the Food and Drug Administration Amendments Act of 2007 (Public Law 110-85) also known as FDAAA, entitled "PROHIBITION AGAINST FOOD TO WHICH DRUGS OR BIOLOGICAL PRODUCTS HAVE BEEN ADDED", which amended section 301 of the Federal Food, Drug, and Cosmetic Act.

Response: A detailed legal assessment (attached) of this regulation which was prepared for Cognis has concluded that the Alkyl Polyglycoside Surfactants that are the subject of GRAS Notice No. 237 pending before the Food and Drug Administration do not violate section 301(ll) of the Federal Food, Drug, and Cosmetic Act, 21 U.S.C. 331(ll), and are permissible in food products that are marketed and sold in interstate commerce because the substances are generally recognized as safe for the designated uses.

Point #2: Revising the Specifications for Lead to indicate that the maximum level is <1PPM.

Response: Attached is a revised specification for the alkyl polyglycoside surfactants that are the subject of this GRAS notice 237 indicating that the Lead level permitted is <1PPM. This is the result of analysis of 6 non-consecutive manufactured lots of Glucopon® 600 UP (attached) that support the consistency of the product and reliability of the determination for Lead. It should be emphasized that the starting materials are the same for other alkyl polyglycosides of different chain lengths and this particular chain length was chosen as it represents what can be anticipated in other lots of different chain lengths.

000096

Point #3: FSIS comments as follows:

While we do not have any objection to the use of the alkyl polyglycoside surfactants in hog scalding and poultry defeathering solutions, at a level sufficient for the purpose of increasing the wetting ability of the caustic solution, we are unable to comment on the suitability of the use of these surfactants to wash meat during butchering. Cognis has not indicated what the functional purpose is for that application nor have they provided any data to support that use. Consequently, from the standpoint of use to wash meat during butchering, FSIS cannot consider this to be a complete petition.

Response: FSIS specifically asked about the functional purpose of the use of the alkyl polyglycoside surfactants to wash meat during butchering. Clearly the purpose stated in the GRAS notification is for the cleaning and dehairing of meat carcasses or the defeathering of poultry which usually involves the use of caustic solutions.

Alkyl Polyglycosides are stable in caustic media and will aid the effectiveness of the caustic by increasing the wetting ability of the caustic solution. Thus, the functional purpose of the alkyl polyglycoside as a surfactant is to enhance the water washes' ability to effectively get rid of hair, unwanted blood and fecal matter and other parts not used for human consumption. Surfactants reduce the surface tension of water by adsorbing at the liquid-gas interface. They also reduce the interfacial tension between oil and water by adsorbing at the liquid-liquid interface thus functioning as wetting agents that allow for the spread of water and solubilization of organic matter that facilitates their removal from the carcass in butchering. Surfactants constitute the most important group of detergent components. Generally, these are water-soluble surface-active agents comprised of a hydrophobic portion, usually a long alkyl chain, attached to hydrophilic or water solubility enhancing functional groups. The caustic wash is then followed by a potable water rinse that removes more than 95% of the residual Alkyl Glycoside.

Calculations are provided for theoretical exposure during the washing process of butchering followed by an additional rinse. These demonstrate the likelihood of exposure to significant amounts of alkyl polyglycosides is extremely small. We believe that the petition clearly addresses both functionality and exposure.

A follow-up conference call was held on April 15, 2008 with Mr. Bill Jones, Chemist, Labeling and Program Division, USDA, FSIS, OPPDE, LPDD, Dr. Karin Ricker (FDA) and Cognis Corporation representatives (Cindy Becknell and Dr. Stanley Tarka) to clarify the petitioner's request to use these APG surfactants for washing the meat during butchering. At that time

Cognis explained the application will be to the beef and meat carcasses, after the hide has been removed, to remove any extraneous hair, dirt, etc. According to GRN Notice 000237 the meat (i.e., carcasses) will be washed with a 2% active solution of the alkyl polyglycoside surfactants, followed by a potable water rinse. Mr. Jones subsequently provided FDA (Dr. Ricker) with an email indicating that USDA does not have any objection to the use of the alkyl polyglycoside surfactants, under the conditions stated above, for use on beef carcasses to remove any extraneous hair, dirt, etc.

We trust that this addresses all remaining questions on GRAS Notification 237 and look forward to moving this Notification forward.

Sincerely,

(b)(6)

Stanley M. Tarka, Jr., Ph.D.

Senior Consultant

17015) and for Glucopon 625 (DMF 12500), two of the alkyl polyglycoside surfactants that are included in GRN No. 237. The DMFs were submitted on December 1, 2003, and May 8, 1997, respectively. Both submissions were Type II DMFs. The DMF status is active.

The two DMFs do not include information pertaining to the use of the surfactants as a "drug product" or as a "drug substance" as those terms are defined by FDA, 21 CFR 314.3(b). The DMFs do not pertain to the use of the surfactants as a finished dosage form or as an active ingredient intended to furnish pharmacological activity. Instead, the type of information in the DMFs is similar to the information in the GRAS Notice, i.e., scientific and technical data concerning the use of the inactive substances as a surfactant for cleaning purposes.

As set forth above, the alkyl polyglycoside surfactants are not active or inactive ingredients in any drug product approved by FDA under section 505 of the Federal Food, Drug, and Cosmetic Act. They have been used for cleansing performance in personal care products such as cosmetic facial scrubs. Therefore, the submission of the two Drug Master Files is not relevant to an administrative determination concerning the GRAS status of the surfactant substances.

Conclusion: The Alkyl Polyglycoside Surfactants that are the subject of GRAS Notice No. 237 pending before the Food and Drug Administration do not violate section 301(ll) of the Federal Food, Drug, and Cosmetic Act, 21 U.S.C. 331(ll), and are permissible in food products that are marketed and sold in interstate commerce because the substances are generally recognized as safe for the designated uses.

toxicologists have critically evaluated the production process for Alkyl Polyglycosides summarized above and have concluded that this process is well characterized and can consistently yield a food-grade product that is safe for human consumption.

C. Food Grade Specifications for Alkyl Polyglycosides

Cognis has been producing Alkyl Polyglycoside surfactants in their commercial facility since 1992. Cognis' Alkyl Polyglycoside surfactants, under the product trade names Glucopon®/APG®, have similar specifications. Analytical testing has shown that all products shipped during this period meet the specifications. Table 1 shows the specifications for APG®/Glucopon® surfactants as provided by Cognis Corporation.

Table 1 Specifications for APG®/Glucopon® Surfactants

	Glucopon® 215 UP	Glucopon® 225 DK	APG® 325N	Glucopon® 425N	Glucopon® 600 UP	Glucopon® 625 UP
Actives %	62 - 65	68.0 - 72.0	48.0 - 52.0	48 0 - 52.0	48 0 - 52.0	48.0 - 52.0
Ash %			3.0 Max	3.0 Max	3.0 Max	3.0 Max
Color, Gardner			7.0 max	4 0 max	3 0 max	4 0 max
Free Fatty Alcohol			0 5 max			
pH, 10% Solution*	11.5 -12.5	6.0 - 9.0	7.0 - 9.5	7 0-9 5	11.5 - 12.5	11.5 - 12.5
Preservatives			Pass**	Pass**		
Water	35 - 38	28.0 - 32.0				

Blank spaces = no specifications
* 10% solids solution using an 85/15 DI water / IPA mixture. Also, the pH is intentionally high because there is no preservative added.
** Pass refers to presence of gluteraldehyde as the preservative as others contain none. These two products can be made with or without gluteraldehyde

Cognis also monitors the Alkyl Polyglycoside products to ensure levels of by-products and impurities meet internal standards for current cosmetic and meat room degreasing applications. Below is an example of the type of by-products / impurity analyses that Cognis reports for Alkyl Polyglycoside products.

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By-products and Impurities
(not regularly determined)

By-Product/Impurity	Concentration	Method of Analysis	Detection Limit
Arsenic	below detection limit	Ph.EUR.3 2.4.2.	1 ppm
Heavy metals (total as Pb)	below detection limit	ICP (AOAC Method 993.14)	1 ppm
Organic compounds			
Fatty alcohol	max. 1 %	HPLC	
Glucose	max. 0.5 %	COGNIS method	
Iron	<1= 5 ppm	AAS	1 ppm
Magnesium	< 600 ppm		
Polyglucose	3 - 5 %	COGNIS method	
Sulphated ash	<3 %	Ph.EUR.32 4.14.	0 1 %
Water	component of the content	DGF C-11I13a / H-III 3a	<1%1>1%

Cognis' toxicologists conclude that the analyses of the Alkyl Polyglycosides which are the subject of this Notification support the presumption that there is no toxicological concern from any product impurities.

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April 23, 2008
Q Lab Reference No. 140818
P.O. #47296497

Tom Mueller
Cognis Corporation
4900 Este Avenue
Cincinnati, OH 45232

The following results were obtained from the sample(s) submitted to Q Laboratories, Inc. on April 16, 2008 for assay:

SAMPLE IDENTIFICATION

Q LAB NO.	CLIENT'S IDENTIFICATION OF SAMPLE
1	600UP U28D15Z022
2	600UP U28B25Z028
3	600UP U27L17Z021
4	600UP U27K21Z024
5	600UP U27F14Z015
6	600UP U28A29Z031

METHODOLOGY

TEST	METHOD
Lead	ICP

RESULTS

ASSAY	Q LAB NO. 1	Q LAB NO. 2
ppm Lead	< 1	< 1

ASSAY	Q LAB NO. 3	Q LAB NO. 4
ppm Lead	< 1	< 1

ASSAY	Q LAB NO. 5	Q LAB NO. 6
ppm Lead	< 1	< 1

Q LABORATORIES, INC.

David G. Goins
President

kmg