

Investigation into polycyclic aromatic hydrocarbons (PAHs) in banana chips

Report to the Food Standards Agency

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Investigation into polycyclic aromatic hydrocarbons (PAHs) in banana chips

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Opinions and interpretations are outside the scope of UKAS accreditation. The following reported analyses fall within the scope of UKAS accreditation: PAHs



Glossary of Main Terms

Term or Acronym	General Meaning Of Term
BaP	Benzo[a]pyrene
EFSA	European Food Safety Authority
FAPAS	Food Analysis Proficiency Assessment Scheme
JRC-IRMM	Joint Research Centre - Institute for Reference Materials and Measurements
PAHs	Polycyclic aromatic hydrocarbons
PAH 4 Sum	Sum of 4 PAHs (beno[a]pyrene, benz[a]anthracene, benzo[b]fluoranthene, chrysene)
Whole weight	Values based on the sample as received 'whole' or wet
Lower bound	assumes values at less than the limit of detection are zero (e.g.<0.01=0)
Upper bound	assumes values at less than the limit of detection are equal to the limit of detection (e.g. <0.07=0.07)
µg/kg	Microgram per kilogram (x 10-6/ part per billion)
HRGC-LRMS	High resolution gas chromatography – unit resolution mass spectrometry
UKAS	United Kingdom Accreditation Service

Executive Summary

There are known to be elevated levels of Polycyclic aromatic hydrocarbons (PAHs) in banana chips which could arise through the drying process or during the cooking stage, - which usually involves frying in coconut oil. PAHs constitute a large class of organic compounds with two or more fused aromatic rings and occur in complex mixtures consisting of hundreds of compounds. As contaminants of food they are of concern because some of these compounds have been identified as genotoxic carcinogens, mutagens and teratogens.

106 retail banana chip samples were sourced locally from supermarkets, health food stores, ethnic food suppliers and from internet retailers. These included 88 samples prepared in coconut oil, 4 in palm oil, 4 sundried and 10 that were supplied with no information on product preparation.

The samples were homogenised and analysed using an established, validated analytical procedure for PAHs that is UKAS accredited to the ISO 17025 standard and has been reported before in detail to the FSA. The methodology is based on internal standardisation (¹³Carbon) with measurement by GC-MS.

Of the 28 PAH compounds monitored, those with lower molecular weight were found to occur in the majority of the samples. Of the more toxicologically significant and regulated compounds, benzo[a]pyrene concentrations ranged from <0.06 to 3.22 µg/kg of product, and PAH4 SUM concentrations ranged from 0.29 to 54 µg/kg of product. Approximately two thirds of the samples showed relatively low levels with PAH4 SUM concentrations occurring below 5µg/kg. Samples showing the highest PAH4 SUM concentrations (n=11), were all found to have been prepared using coconut oil.

1. Study Background

There are known to be elevated levels of Polycyclic aromatic hydrocarbons (PAHs) in banana chips due to the cooking/drying methods used to prepare them, which usually involve frying in coconut oil.

PAHs are a complex group of chemicals with two or more fused aromatic ring systems. The molecules do not contain heteroatoms and are not substituted. PAHs occur naturally in coal, crude oil and tar deposits, and can be inadvertently produced as by-products of incomplete fossil fuel or biomass combustion. As environmental pollutants, they are of concern because some compounds have been identified as genotoxic carcinogens, mutagens and teratogens. They occur widely in the environment and their environmental transport is governed by their volatility and chemical reactivity. They are also lipophilic with poor aqueous solubility and unless metabolised, tend to occur in the lipid rich tissues of plants and animals.

The PAH content of some food is regulated in the EU based on the conclusions of EFSA, and uses the system of maximum permitted levels for the sum of four substances (PAH4; the sum of benzo(a)pyrene, benz(a)anthracene, benzo(b)fluoranthene and chrysene) whilst maintaining a separate maximum level for benzo(a)pyrene (BaP).

The processing of food – smoking, cooking over a direct heat source (barbecuing), drying etc, are generally recognised as a major source of PAH contamination in food (Lijinsky and Ross 1967, Saint-Aubert et al 1992, Lintas et al 1979, White et al 2008). In the context of the current investigation, the most commonly used process for preparation of banana chips involves frying in coconut, or other highly saturated, oils. The condensation and absorption mechanisms that occur on the surface of the food are likely to lead to the PAHs being incorporated into the food.

The FSA has carried out a number of studies on PAHs over the last few years, and these have usually been targeted towards certain foods such as smoked shellfish, cereals and dried and smoked products which may be expected to show the presence of PAHs due to processing. Data from the current study will allow background concentrations to be established and should help with the risk assessment and discussion of any potential regulation on the PAH content of banana chips.

2. Study Experimental

2.1 Sample Collection and Preparation

A list of samples including a description and FERA sample number is given in Table 1.

106 retail banana chip samples and products containing substantial quantities of banana chips, such as cereals and trail mixes, were sourced locally from supermarkets, health food stores, ethnic food suppliers and also from internet retailers. There were a total of 88 samples prepared in coconut oil, 4 in palm oil, 4 sundried and 10 that were supplied with no information of how they were prepared. During the initial sampling exercise, limited numbers of samples of banana chips prepared in coconut oil were found to be available, so duplicate products with different batch codes or best before dates were obtained where possible. for those found to have both elevated and lower levels of PAH.

On receipt at the laboratory, each sample was given a unique laboratory reference number and the sample details were logged into a database. For cereals and other mixes, components other than banana chips were separated and excluded from the analytical sample. All samples were ground to a small particle size (<1mm), and were then thoroughly homogenised. Approximately 5g aliquots of sample were taken for analysis.

2.2 Contaminants measured – Specific Analytes

The following analytes were determined: Regulated contaminants are highlighted in **bold**.

PAHs - acenaphthene, acenaphthylene, fluorene, phenanthrene, anthracene, fluoranthene, benzo[c]fluorene, pyrene, benzo[e]pyrene, benzo[b]naphtho[2,1-d]thiophene, anthanthrene, coronene, benzo[ghi]fluoranthene, **benz[a]anthracene**, **chrysene**, **benzo[b]fluoranthene**, benzo[j]fluoranthene, benzo[k]fluoranthene, **benzo[a]pyrene**, cyclopenta[c,d]pyrene, indeno[123cd]pyrene, dibenzo[ah]anthracene, benzo[ghi]perylene, dibenzo[al]pyrene, dibenzo[ae]pyrene, dibenzo[ai]pyrene, dibenzo[ah]pyrene and the substituted PAH, 5-methylchrysene

2.3 Analytical Methodology

The analytical methodology for the PAHs has been published (Rose et al, 2007) and reported before in detail to the FSA (Fernandes et al 2011). The methodology is based on internal standardisation (¹³Carbon) with GC-MS measurement. An aliquot of the homogenised sample was FSA 2014- A56FW001

fortified with ^{13}C -labelled analogues of target compounds and saponified with methanolic potassium hydroxide. The extracted PAH solutions were purified in two stages with a DMF/cyclohexane partition followed by adsorption chromatography on activated silica. A sensitivity standard was added to the purified extracts and these were measured using high resolution gas chromatography with unit resolution mass spectrometry.

2.4 Quality Control

Fera is the UK National Reference Laboratory for PHs in food. The analytical procedure for PAHs is UKAS accredited to the ISO 17025 standard and includes the assessment of method blanks and reference materials, (RM0651, PAHs in palm oil – FAPAS 2012) for compliance with the accreditation criteria. The methodology also meets the criteria required for evaluating data against the maximum permitted limits for benzo[a]pyrene as specified in EU Commission Regulations. Additionally, FERA has also participated in recent international inter-comparison exercises (JRC-IRMM 2012, 2013 FAPAS 2012, 2013) where results reported by the laboratory were in good agreement with consensus data.

3. Results & Discussion

The concentrations of the 28 PAH compounds measured in this study are given in Table 2. The concentrations are reported in µg/kg of banana chip product as obtained or µg/kg of banana chip portion of product where the banana chips were part of a cereal or mix. Data was rounded to two decimal places for all analytes. Measurement uncertainty has been included for each sample.

The reporting limits quoted (as “<”) for all analytes was the limit of determination that prevailed in that instance. The limit is calculated dynamically for each compound in each sample, and takes into account instrument signal-to-noise levels, sample weight, analytical recovery and concentrations detected in method blanks.

Of the 28 PAH compounds monitored, those with lower molecular weight were found to occur in the majority of the samples. BaP concentrations for the regulated compounds ranged from <0.06µg/kg to 3.22µg/kg and PAH4 SUM concentrations ranged from 0.29µg/kg to 54.39µg/kg.

Approximately two thirds of the samples showed relatively low levels with PAH4 SUM concentrations occurring below 5µg/kg, and these products encompassed the range of preparation techniques used (sun-drying, palm and coconut oil frying). Sundried products, however, were found to show lower levels of PAH contamination, with only one of these products having a PAH4SUM value above 5µg/kg. On the other hand, the 10 % of samples with the highest concentrations were all found to have been prepared using coconut oil.

4. References

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Table 1: Overview of samples

OEC Sample No.	FERA LIMs No.	Product	Lot #	BB Date:	Oil used
22120	S13-063208	Fruit & Fibre	Lot: 3322	BB: 18/11/14	Coconut
22117	S13-063205	Fruit & Fibre	Lot: 3318	BB: 14/11/14	Coconut
21669	S13-049140	Banana Chips	MFG Code: 177226	BIUB: 08/05/14	Coconut
22036	S13-058826	Banana Chips	MFG Code: 181071	BIUB: 09/18/14	Coconut
21657	S13-048984	Organic Banana Chips Yoghurt White Chocolate	ID: PR123381	BB: 25-10-2013	Coconut
21650	S13-048818	Organic Banana Chips Yoghurt White Chocolate			Coconut
21668	S13-049139	Sweetened Banana Chips	ID: 15:843 09:19 06/10/2013	SB: 06/10/2014	Coconut
22035	S13-058825	Sweetened Banana Chips	ID: 155335 19:16 08/19/2013	Sell by 08/19/2014	Coconut
22173	S13-064362	Crunchy Tropical Fruit Crisp	ID: 3196 16:25	BBE: 15 07 2014	Coconut
21651	S13-048819	Banana Chips	Batch No: 120825	BB: 15 Mar 2014	Coconut
22100	S13-062326	Banana Chips	Batch: 120825	BB: 22 May 2014	Coconut
21652	S13-048820	Organically Grown Banana Chips	Batch No: P0014543-3	BB: 08 Mar 2014	Coconut
21633	S13-047888	Pure and Natural Banana Chips	Lot: 1 215	BBE: Aug 12	Coconut
22123	S13-063211	Fruit & Nut Muesli	Lot: 3283	BB: 10/10/14	Coconut
22124	S13-063212	Fruit & Fibre	Lot: 32310953	BB: 19/5/14	Coconut
21647	S13-048022	Banana Chips Honey Coated	Batch Code: 006624 1308 2, Product Code: BBC1	BB: 12/08/2014	Coconut
22030	S13-058723	Banana Chips	Batch Code: 006624 1308 2, Product Code: BBC1	BB: 12/08/2014	Coconut
22132	S13-063241	Banana Chips	Batch: 4YM0310 3	BB: 01/10/2014	Coconut
21615	S13-047870	Banana Chips		BBE: 19.02.2014	No Info

OEC Sample No.	FERA LIMs No.	Product	Lot #	BB Date:	Oil used
21659	S13-048986	Banana Chips	ID: 52 5801F24M		Coconut
22252	S14-005438	Banana Chips	batchS2S8B01Y07N	BBE July 2014	Coconut
21960	S13-049301	Sweetened Dried Banana Chips	319940543A	31/07/2014	Coconut
22032	S13-058725	Banana Chips	ID: 319940543A	Dated: 31/07/2014	Coconut
21614	S13-047869	Banana Chips	ID: D 224	BBE: 31 Jul 2014	Coconut
21556	S13-045689	Tropical Sunshine mix 7% Bananas	N/A	BBE 23 11 2013	palm oil
21628	S13-047883	Sweetened Banana Chips	N/A	BB: 27/Feb/2014	Coconut
22171	S13-064360	Sweetened Banana Chips	N/A	BB: 06/Jul/2014	Coconut
21547	S13-045665	Banana Chips	N/A	BBE 10 MAR 2014	Coconut
21549	S13-045667	Plantain Chips (Savoury)	D1 2	31 01 14	palm oil
22268	S14-009648	Organically Produced Dried Banana Chips	Code: 15799 HER002	BB: 31 May 2014	Coconut
21672	S13-049165	Organically Produced Dried Banana Chips	ID: 15799 HER002	BB: 28 Dec 2013	Coconut
21658	S13-048985	Dried Banana Chips	ID: 15199 1GH001	BB: 08 Jan 2014	Coconut
22263	S14-009515	Dried Banana Chips	Code: 15199 1GH001	BB: 04 Mar 2014	Coconut
22352	S14-009764	Organic Banana Chips	Code: 061113a	BBE: Nov 14	Coconut
21671	S13-049164	Organic Banana Chips	ID: 110713a	BBE: Aug 14	Coconut
22113	S13-063196	Crunchy Oat Granola Tropical Fruits	Lot; LD3273	BB: 31/5/14	Coconut
22114	S13-063197	Crunchy Oat Granola Fruit & Nut	Lot; LC3274	BB: 31/5/14	Coconut
21653	S13-048821	Banana Chips	ID: 1172943	BBE: Mar 2014	Coconut
22078	S13-060103	Banana Chips	Batch: 1177398, Code: 198.71	BBE: May 2014	Coconut
21557	S13-045691	Banana Chips	Batch 1175616	BBE: Mar 2014	Coconut

OEC Sample No.	FERA LIMs No.	Product	Lot #	BB Date:	Oil used
21639	S13-047894	Kenyan Banana Rounds (Matoke)	Batch No: 130609	BB: 30-04-14	No Info
21640	S13-047895	Kenyan Banana Rounds (Matoke) Unsalted	Batch No: 130610	BB: 30-04-14	No Info
22121	S13-063209	Muesli Luxury Fruit & Nut	Lot: 3297	BB: 1/10/14	Coconut
22122	S13-063210	Muesli Luxury Fruit	Lot: 3277	BB: 1/10/14	Coconut
22125	S13-063213	Fruit & Nut Muesli	Lot: 3299	BB: 26/10/14	Coconut
22126	S13-063214	Muesli 55% added Fruit	Lot 3298	BB: 25/10/14	Coconut
22127	S13-063215	Fruit & Fibre	Lot: 3317	BB: 13/11/14	Coconut
22128	S13-063216	Wholewheat Muesli	Lot L3301	BB: 28/10/14	Coconut
22408	S14-009863	Fruit and Flake	N/A	BB: 09 12 2014	Coconut
21667	S13-049138	Dried Honey Dipped Bananas	Part Code: 40789, Prod: FRBNC04		Coconut
22034	S13-058736	Honey Dipped Banana Chips	Part Code: 40789, Prod:#FRBNC04, LS3/268/A 08:28	BBE: Jul/14	Coconut
21545	S13-045536	Banana Chips	13204 2 76229	BBE Mar 2014	Coconut
21546	S13-045537	Sun Dried Bananas	13 157 1236 H74754	BBE Mar 2014	sun dried
21552	S13-045670	Banana Chips	13184 5 75958	BBE Apr 2014	Coconut
21553	S13-045671	Banana Chips coated in Chocolate and Yoghurt	13149 5 74328	BBE Mar 2014 13149 5 74328	Coconut
21555	S13- 045688	Super Trail Mix 20% Bananas	13164 5 75777	BBE Jan 14	Coconut
22281	S14-009662	Wholefoods, Super Trail Mix	13261 12:15 2 77133	BBE: Apr 14	Coconut
22282	S14-009663	Banana Chips coated in Milk Chocolate & Yogurt Flavor Coating	13247 21:36 4 76714	BBE: Jun 14	Coconut
22283	S14-009664	Assorted Chocolate Banana	13287 07:54 78094	BBE: May 14	Coconut
22284	S14-009665	Banana Chips	13323 11:09 4 79027	BBE: Aug 14	Coconut
21635	S13-047890	Banana Chips	Lot No: 21 DQA	BBE: April 2015	No Info

OEC Sample No.	FERA LIMs No.	Product	Lot #	BB Date:	Oil used
21550	S13-045668	Banana Chips	3171 C3	BBE June 2014	Coconut
21551	S13-045669	Organic Banana Chips	N/A	BB14 Apr 2014	Coconut
21554	S13-045672	Toasted Coconut Chips	N/A	BBE 13 April 2014	Coconut
22097	S13-061747	Organic Organically Produced Banana Chips	N/A	BB: 06-05-2014	Coconut
22096	S13-061746	Honey Dipped Banana Chips		BB: 18-05-2014	Coconut
22109	S13-063173	Wholegrain Fruit & Fibre	Lot;32890953	BB: 16/7/14	Coconut
22111	S13-063185	Tropical Granola	Lot; L3317B1B	BB: 13/8/14	Coconut
22112	S13-063186	Banana, Date & Coconut Muesli	Lot; L3290B7	BB: 17/10/14	Coconut
21562	S13-045864	Banana Coins	L3190 A 520 1	BBE Jan 2014	sun dried
22110	S13-063184	Breakfast Muesli	Lot328119110	BB: 8/10/14	Coconut
21510	S13-045454	Plantain Chips Sweet	128415	May 2014	palm oil
21631	S13-047886	Mari Kela Wafe with Black Pepper	Lot No: 02, Mfg/Pkd Dt: 23/05/13		No Info
22191	S13-065629	Banana Chips	13326 L 3	BBE November 2014	Coconut
21661	S13-049105	Yoghurt Banana Chips	Batch: CP173 2 x 653	BB: 20/01/2014	Coconut
21666	S13-049137	Banana Chips	Rotation No: WH771, Order Code: DR174	BB: 09 Dec 13	Coconut
21665	S13-049109	Sweetened Banana Chips	Batch: CP173 DR054,	BB: 18/04/2014	Coconut
22033	S13-058726	Sweetened Banana Chips	Batch: CP180 DR120	BB: 14/06/2014	Coconut
22266	S14-009518	Organic Sweetened Banana Chips	Batch: CP182 DR655	BB: 04/07/2014	Coconut
22115	S13-063203	Fruit & Fibre	Lot; 3318	BB: 14/11/14	Coconut
22130	S13-063218	Fruit & Nut Muesli	Lot: L3318	BB: 14/11/14	Coconut
22131	S13-063219	Fruit & Nut Granola	Lot: L3298	BB: 25/7/14	Coconut
21509	S13-045453	Tropical Mix	L3076008 BN 01	BBE Dec 13	Coconut

OEC Sample No.	FERA LIMs No.	Product	Lot #	BB Date:	Oil used
22116	S13-063204	Fruit & Fibre	Lot; 3304	BB: 31/10/14	Coconut
22129	S13-063217	Tropical Fruit & Nut Muesli	Lot: 3290	BB: 17/10/14	Coconut
22265	S14-009517	Organic Banana Chips	Code: 3282 360mmON1 035980	BB: 06/07/2014	Coconut
21624	S13-047879	Banana Chips	N/A	BB: 03/02/2014	Coconut
21664	S13-049108	Banana Chips	ID: 3142 360mmN1 314476	BB: 16/02/2014	Coconut
21662	S13-049106	Yoghurt Coated Banana Chips	ID: 3108 315mmN1 319137	BB: 13/01/2014	Coconut
21663	S13-049107	Organic Banana Chips	ID: 3098 455mmON1 060020	BB: 03/01/2014	Coconut
21660	S13-049104	Banana Chips	Lot: 31831	BBE: Jun 2014	Coconut
22264	S14-009516	Banana Chips	Lot: 322ON2 08:56	BBE: Aug 2014	Coconut
21558	S13-045692	Dried Whole Banana	N/A	BBE 02 14	sun dried
21544	S13-045535	Banana Chips	N/A	BB 07 05 2013	Coconut
22118	S13-063206	Fruit & Fibre	Lot; 32850953	BB: 12/7/14	Coconut
22119	S13-063207	Fruit Muesli	Lot; LC3270	BB: 28/5/14	Coconut
21548	S13-045666	Wholesome Banana Slices	L3133A 770 2	BBE Feb 14	sun dried
22172	S13-064361	Fruit and Fibre	ID: 3301 09:19 5	BB: 28/10/2014	Coconut
22409	S14-009864	Banana Chips	L 4010A 740 1	BBE: Oct 2014	Coconut
21508	S13-045452	Banana Chips	1XL143B740 1 AND 2XL3155B740 2	BBE MAR 2014	Coconut
21511	S13-045455	Plantain Chips Savoury	121318	May 2014	palm oil
21646	S13-048021	Banana Chips 100% Sun Dried	N/A	BBD: 31/12/2015	No Info
21649	S13-048817	Milk Chocolate Covered Banana Chips	N/A	N/A	No Info
21957	S13-049298	Banana Chips	N/A	BB: 12/09/2014	No Info
21958	S13-049299	Milk Chocolate Banana Chips	N/A	N/A	No Info
21959	S13-049300	Yoghurt Coated Banana Chips	N/A	N/A	No Info

Table 2. PAH concentrations - µg/kg whole weight

OEC Sample No.	22120	22117	21669	22036				
FERA LIMS No.	S13-063208	S13-063205	S13-049140	S13-058826				
Description	Fruit & Fibre	Fruit & Fibre	Banana Chips	Banana Chips				
ug/kg whole weight		%U	%U	%U				
acenaphthylene	1.98	30	0.60	128	8.53	21	3.84	33
acenaphthene	<0.56	201	0.56	166	1.53	75	0.58	201
fluorene	1.26	82	1.35	78	13.85	22	7.72	25
phenanthrene	5.07	34	12.53	23	154.06	21	108.31i	21
anthracene	0.79	25	2.53	21	45.63	21	27.6i	21
fluoranthene	2.79i	41	10.43	22	84.30	21	67.2i	21
benzo[c]fluorene	0.21	23	0.83	21	4.75	21	3.59	21
pyrene	3.27i	35	10.95	22	89.95	21	69.5i	21
benzo[ghi]fluoranthene	0.46	31	1.59	16	11.43	16	8.37	16
benz (a) anthracene	0.41	29	1.60	16	14.38	16	10.85	16
benzo[b]naphtho[2,1-d]thiophene	<0.04	201	<0.04	201	<0.12	201	<0.12	201
cyclopenta[c,d]pyrene	0.09	27	0.63	16	9.03	16	5.23	16
chrysene	0.56	27	2.09	17	18.03	16	14.39	16
5-methylchrysene	0.01	201	<0.04	201	<0.08	201	<0.06	201
benzo[b]fluoranthene	0.13	155	0.45	43	2.95	18	2.89	18
benzo[jj]fluoranthene	0.08	30	0.28	18	2.09	17	1.93	17
benzo[k]fluoranthene	0.06	101	0.14	33	0.84	21	0.91	20
benzo[e]pyrene	0.13	64	0.76	18	2.91	17	2.58	17
benzo[a]pyrene	0.10	121	0.37	57	1.96	20	1.99	20
indeno[1,2,3-cd]pyrene	<0.09	201	0.23	38	0.38	26	0.57	21
dibenz[ah]anthracene	<0.04	201	<0.05	201	<0.06	201	<0.08	201
benzo-[g,h,i]perylene	0.07	115	0.30	21	0.44	18	0.70	18
anthanthrene	<0.1	201	<0.1	201	<0.1	201	<0.1	201
dibenzo[a,l]pyrene	<0.1	201	<0.1	201	<0.1	201	<0.1	201
dibenzo[a,e]pyrene	<0.1	201	<0.1	201	<0.1	201	<0.1	201
dibenzo[a,i]pyrene	<0.1	201	<0.1	201	<0.1	201	<0.1	201
dibenzo[a,h]pyrene	<0.1	201	<0.1	201	<0.1	201	<0.1	201
coronene	<0.1	201	<0.1	201	<0.1	201	0.11	183
PAH 4 Sum Lower ug/kg	1.20		4.51		37.32		30.12	
PAH 4 Sum Upper ug/kg	1.20	61	4.51	12	37.32	3	30.12	3

OEC Sample No.	21657	21650	21668	22035
FERA LIMS No.	S13-048984	S13-048818	S13-049139	S13-058825
Description	Organic Banana Chips Yoghurt White Chocolate	Organic Banana Chips Yoghurt White Chocolate	Sweetened Banana Chips	Sweetened Banana Chips
ug/kg whole weight	%U	%U	%U	%U
acenaphthylene	3.56	21	12.88	21
acenaphthene	0.78	117	1.96	51
fluorene	4.69	29	11.52	23
phenanthrene	33.94	21	68.01	21
anthracene	6.45	21	14.76	21
fluoranthene	16.99	21	32.77	21
benzo[c]fluorene	0.94	21	1.01	21
pyrene	12.38	22	24.31	21
benzo[ghi]fluoranthene	1.27	17	2.67	16
benz (a) anthracene	1.28	17	2.49	16
benzo[b]naphtho[2,1-d]thiophene	<0.06	201	0.21	25
cyclopenta[c,d]pyrene	0.89	16	1.38	16
chrysene	1.56	17	3.11	16
5-methylchrysene	0.01	201	<0.03	201
benzo[b]fluoranthene	0.40	26	0.53	23
benzo[j]fluoranthene	0.26	19	0.30	18
benzo[k]fluoranthene	0.14	22	0.20	20
benzo[e]pyrene	0.32	21	0.51	19
benzo[a]pyrene	0.28	80	0.36	63
indeno[1,2,3-cd]pyrene	<0.12	201	0.09	112
dibenz[ah]anthracene	<0.05	201	<0.05	201
benzo-[g,h,i]perylene	0.12	37	0.11	40
anthanthrene	<0.1	201	<0.1	201
dibenzo[a,l]pyrene	<0.1	201	<0.1	201
dibenzo[a,e]pyrene	<0.1	201	<0.1	201
dibenzo[a,i]pyrene	<0.1	201	<0.1	201
dibenzo[a,h]pyrene	<0.1	201	<0.1	201
coronene	<0.1	201	<0.1	201
PAH 4 Sum Lower ug/kg	3.52		6.49	
PAH 4 Sum Upper ug/kg	3.52	15	6.49	9
			33.79	3
			23.12	3

OEC Sample No.	22173	21651	22100	21652				
FERA LIMS No.	S13-064362	S13-048819	S13-062326	S13-048820				
Description	Crunchy Tropical Fruit Crisp	Banana Chips	Banana Chips	Organically Grown Banana Chips				
ug/kg whole weight	%U	%U	%U	%U				
acenaphthylene	0.42	39	0.62	33	0.52	163	2.70	22
acenaphthene	1.11	79	<0.45	201	<0.53	201	0.61	149
fluorene	1.96	49	2.07	50	1.45	71	1.43	69
phenanthrene	10.12	25	31.88	21	8.96	25	4.59	31
anthracene	1.41	22	7.07	21	1.67	22	0.76	25
fluoranthene	4.82i	29	24.37	21	9.32	22	3.74	27
benzo[c]fluorene	0.42	22	0.72	21	0.53	22	0.40	22
pyrene	4.66i	38	22.03	21	10.96	22	4.69	26
benzo[ghi]fluoranthene	1.23	20	2.77	16	1.42	16	0.81	19
benz (a) anthracene	1.27	18	3.06	16	0.87	17	0.75	19
benzo[b]naphtho[2,1-d]thiophene	<0.03	201	0.04	101	<0.04	201	<0.02	201
cyclopenta[c,d]pyrene	0.34	17	0.51	16	0.61	16	0.53	16
chrysene	1.72	17	4.03	16	1.13	19	0.97	19
5-methylchrysene	<0.03	201	<0.03	201	<0.03	201	<0.01	201
benzo[b]fluoranthene	0.39	31	0.81	20	0.32	59	0.22	40
benzo[j]fluoranthene	0.25	19	0.55	17	0.16	21	0.11	25
benzo[k]fluoranthene	0.11	110	0.26	19	0.08	151	0.08	30
benzo[e]pyrene	0.53	20	0.84	18	0.41	20	0.21	25
benzo[a]pyrene	0.26	49	0.56	43	0.35	65	0.16	139
indeno[1,2,3-cd]pyrene	0.11	74	0.27	34	0.31	30	0.09	112
dibenz[ah]anthracene	<0.04	201	<0.05	201	<0.05	201	<0.05	201
benzo-[g,h,i]perylene	0.13	94	0.37	19	0.46	20	0.12	37
anthanthrene	<0.1	201	<0.1	201	<0.1	201	<0.1	201
dibenzo[a,l]pyrene	<0.1	201	<0.1	201	<0.1	201	<0.1	201
dibenzo[a,e]pyrene	<0.1	201	<0.1	201	<0.1	201	<0.1	201
dibenzo[a,i]pyrene	<0.1	201	<0.1	201	<0.1	201	<0.1	201
dibenzo[a,h]pyrene	<0.1	201	<0.1	201	<0.1	201	<0.1	201
coronene	<0.1	201	<0.1	201	<0.1	201	<0.1	201
PAH 4 Sum Lower ug/kg	3.64		8.46		2.67		2.10	
PAH 4 Sum Upper ug/kg	3.64	12	8.46	7	2.67	21	2.10	30

OEC Sample No.	21633	22123	22124	21647				
FERA LIMS No.	S13-047888	S13-063211	S13-063212	S13-048022				
Description	Pure and Natural Banana Chips	Fruit & Nut Muesli	Co-op Fruit & Fibre	Banana Chips Honey Coated				
ug/kg whole weight								
acenaphthylene	3.58	21	0.98	48	0.87	53	2.83	22
acenaphthene	0.92	100	<0.56	201	<0.56	201	0.57	159
fluorene	6.47	26	0.73	139	2.27	48	3.43	35
phenanthrene	89.88	21	2.28	64	24.01	22	39.31	21
anthracene	18.68	21	0.44	31	3.20	21	7.89	21
fluoranthene	62.95	21	1.85i	57	13.53i	22	29.38	21
benzo[c]fluorene	2.32	21	0.22	23	0.68	21	1.65	21
pyrene	49.35	21	2.38i	44	11.91i	22	23.65	21
benzo[ghi]fluoranthene	8.55	16	0.37	36	0.80	22	3.71	16
benz (a) anthracene	13.00	16	0.35	33	0.77	20	5.66	16
benzo[b]naphtho[2,1-d]thiophene	<0.1	201	<0.04	201	<0.04	201	<0.06	201
cyclopenta[c,d]pyrene	4.20	16	0.08	30	0.13	22	1.74	16
chrysene	17.36	16	0.40	34	1.05	20	7.36	16
5-methylchrysene	<0.1	201	<0.01	201	<0.01	201	<0.22	201
benzo[b]fluoranthene	3.63	17	<0.1	201	0.13	155	1.56	18
benzo[jj]fluoranthene	2.44	17	<0.08	201	0.11	25	1.01	17
benzo[k]fluoranthene	1.13	17	<0.06	201	0.06	101	0.52	17
benzo[e]pyrene	2.74	17	0.09	90	0.14	60	1.17	17
benzo[a]pyrene	2.26	20	0.08	151	0.08	151	1.01	28
indeno[1,2,3-cd]pyrene	0.61	23	<0.08	201	<0.05	201	0.30	37
dibenz[ah]anthracene	<0.12	201	<0.04	201	<0.04	201	<0.07	201
benzo-[g,h,i]perylene	0.62	17	<0.09	201	<0.04	201	0.28	21
anthanthrene	<0.1	201	<0.1	201	<0.1	201	<0.1	201
dibenzo[a,l]pyrene	<0.1	201	<0.1	201	<0.1	201	<0.1	201
dibenzo[a,e]pyrene	<0.1	201	<0.1	201	<0.1	201	<0.1	201
dibenzo[a,i]pyrene	<0.1	201	<0.1	201	<0.1	201	<0.1	201
dibenzo[a,h]pyrene	<0.1	201	<0.1	201	<0.1	201	<0.1	201
coronene	<0.1	201	<0.1	201	<0.1	201	<0.1	201
PAH 4 Sum Lower ug/kg	36.25		0.83		2.03		15.59	
PAH 4 Sum Upper ug/kg	36.25	3	0.93	88	2.03	37	15.59	4

OEC Sample No.	22030	22132	21615	21659				
FERA LIMS No.	S13-058723	S13-063241	S13-047870	S13-048986				
Description	Banana Chips	Banana Chips	Banana Chips	Banana Chips				
ug/kg whole weight		%U	%U	%U	%U			
acenaphthylene	2.77	41	0.44	38	0.78	37	5.73	21
acenaphthene	<0.58	201	<0.42	201	0.98	76	1.06	62
fluorene	1.52	74	0.94	94	1.79	46	12.10	22
phenanthrene	7.67	27	4.14	37	3.17	38	147.74i	21
anthracene	1.20	26	0.86	23	0.63	23	44.63i	21
fluoranthene	8.49i	23	3.49i	35	2.29	34	86.89i	21
benzo[c]fluorene	0.49	23	0.42	22	0.74	21	12.77	21
pyrene	11.63i	22	3.65i	46	4.36	24	92.52i	21
benzo[ghi]fluoranthene	1.67	17	0.74	27	0.84	17	13.67	16
benz (a) anthracene	0.76	18	1.08	18	0.57	21	20.45	16
benzo[b]naphtho[2,1-d]thiophene	<0.05	201	0.10	43	<0.02	201	<0.17	201
cyclopenta[c,d]pyrene	0.74	16	0.37	17	0.14	21	9.12	16
chrysene	0.97	20	1.25	18	0.66	26	25.95	16
5-methylchrysene	<0.01	201	<0.01	201	<0.01	201	<0.11	201
benzo[b]fluoranthene	0.40	48	0.46	28	<0.09	201	4.77	17
benzo[jj]fluoranthene	0.19	20	0.25	19	0.04	53	3.15	17
benzo[k]fluoranthene	0.10	101	0.18	69	<0.04	201	1.45	18
benzo[e]pyrene	0.42	19	0.51	21	0.07	87	3.72	17
benzo[a]pyrene	0.41	56	0.45	32	<0.12	201	3.22	18
indeno[1,2,3-cd]pyrene	0.42	25	0.27	34	<0.06	201	0.60	21
dibenz[ah]anthracene	<0.05	201	<0.07	201	<0.05	201	<0.12	201
benzo-[g,h,i]perylene	0.57	19	0.27	47	<0.03	201	0.59	17
anthanthrene	0.12	167	<0.1	201	<0.1	201	<0.1	201
dibenzo[a,l]pyrene	<0.1	201	<0.1	201	<0.1	201	<0.1	201
dibenzo[a,e]pyrene	<0.1	201	<0.1	201	<0.1	201	<0.1	201
dibenzo[a,i]pyrene	<0.1	201	<0.1	201	<0.1	201	<0.1	201
dibenzo[a,h]pyrene	<0.1	201	<0.1	201	<0.1	201	<0.1	201
coronene	0.14	144	<0.1	201	<0.1	201	<0.1	201
PAH 4 Sum Lower ug/kg	2.54		3.24		1.23		54.39	
PAH 4 Sum Upper ug/kg	2.54	21	3.24	12	1.44	67	54.39	2

OEC Sample No.	22252	21960	22032	21614				
FERA LIMS No.	S14- 005438	S13- 049301	S13- 058725	S13- 047869				
Description	Banana Chips	Sweetened Dried Banana Chips	Banana Chips	Banana Chips				
ug/kg whole weight	%U	%U	%U	%U				
acenaphthylene	7.95	21	1.56	29	2.04	52	0.49	35
acenaphthene	1.16	75	<0.55	201	<0.58	201	<0.31	201
fluorene	9.03	23	0.95	114	1.24	90	1.19	67
phenanthrene	148.11i	21	12.40	23	14.02	23	16.75	22
anthracene	38.43	21	2.81	21	3.17	22	3.73	21
fluoranthene	56.25i	21	26.80	21	30.15i	21	11.83i	21
benzo[c]fluorene	15.90	21	1.60	21	2.15	21	0.68	21
pyrene	127.75i	21	27.64	21	27.96i	21	10.37i	22
benzo[ghi]fluoranthene	13.42	16	5.39	16	5.59	16	1.15	17
benz (a) anthracene	15.49	16	6.79	16	6.93	16	1.46	16
benzo[b]naphtho[2,1-d]thiophene	<0.17	201	<0.11	201	<0.13	201	<0.02	201
cyclopenta[c,d]pyrene	7.68	16	2.63	16	3.87	16	0.41	17
chrysene	19.69	16	8.76	16	9.20	16	1.86	16
5-methylchrysene	<0.12	201	<0.04	201	<0.07	201	<0.01	201
benzo[b]fluoranthene	4.28	17	1.87	19	1.98	19	0.38	36
benzo[jj]fluoranthene	2.90	17	1.26	17	1.26	17	0.25	19
benzo[k]fluoranthene	1.37	19	0.54	25	0.56	25	0.13	79
benzo[e]pyrene	3.86	17	1.84	17	1.89	17	0.39	18
benzo[a]pyrene	3.21	17	1.46	23	1.58	22	0.29	71
indeno[1,2,3-cd]pyrene	0.96	18	0.61	21	0.71	19	0.11	74
dibenz[ah]anthracene	<0.13	201	<0.06	201	<0.06	201	<0.05	201
benzo-[g,h,i]perylene	1.07	19	0.79	17	0.94	17	0.13	35
anthanthrene	0.13	155	<0.1	201	<0.1	201	<0.1	201
dibenzo[a,l]pyrene	<0.1	201	<0.1	201	<0.1	201	<0.1	201
dibenzo[a,e]pyrene	<0.1	201	<0.1	201	<0.1	201	<0.1	201
dibenzo[a,i]pyrene	<0.1	201	<0.1	201	<0.1	201	<0.1	201
dibenzo[a,h]pyrene	<0.1	201	<0.1	201	<0.1	201	<0.1	201
coronene	0.17	119	0.20	101	0.19	106	<0.1	201
PAH 4 Sum Lower ug/kg	42.67		18.88		19.69		3.99	
PAH 4 Sum Upper ug/kg	42.67	2	18.88	4	19.69	4	3.99	13

OEC Sample No.	21556	21628	22171	21547
FERA LIMS No.	S13-045689	S13-047883	S13-064360	S13-045665
Description	Tropical Sunshine mix 7% Bananas	Sweetened Banana Chips	Sweetened Banana Chips	Banana Chips
ug/kg whole weight		%U	%U	%U
acenaphthylene	1.21	25	3.75	21
acenaphthene	0.77	162	0.81	113
fluorene	3.15	47	2.15	49
phenanthrene	16.38	23	31.00	21
anthracene	2.80	21	7.50	21
fluoranthene	14.13	21	32.67	21
benzo[c]fluorene	0.68	21	2.10	21
pyrene	14.17	22	26.58	21
benzo[ghi]fluoranthene	1.77	16	5.05	16
benz (a) anthracene	1.52	16	6.90	16
benzo[b]naphtho[2,1-d]thiophene	<0.04	201	<0.09	201
cyclopenta[c,d]pyrene	0.37	17	3.70	16
chrysene	2.03	16	8.75	16
5-methylchrysene	0.04	52	0.09	27
benzo[b]fluoranthene	0.44	44	1.68	18
benzo[j]fluoranthene	0.25	19	1.15	17
benzo[k]fluoranthene	0.12	151	0.47	17
benzo[e]pyrene	0.50	17	1.51	17
benzo[a]pyrene	0.31	54	1.14	26
indeno[1,2,3-cd]pyrene	<0.18	201	0.22	40
dibenz[ah]anthracene	<0.07	201	<0.06	201
benzo-[g,h,i]perylene	0.20	25	0.25	22
anthanthrene	<0.1	201	<0.1	201
dibenzo[a,l]pyrene	<0.1	201	<0.1	201
dibenzo[a,e]pyrene	<0.11	201	<0.1	201
dibenzo[a,i]pyrene	<0.1	201	<0.1	201
dibenzo[a,h]pyrene	<0.1	201	<0.1	201
coronene	<0.1	201	<0.1	201
PAH 4 Sum Lower ug/kg	4.30		18.47	
PAH 4 Sum Upper ug/kg	4.30	12	18.47	4
			2.66	2.66
			18	18
			4.01	4.01
				12

OEC Sample No.	21549	22268	21672	21658				
FERA LIMS No.	S13-045667	S14-009648	S13-049165	S13-048985				
Description	Plantain Chips (Savoury)	Organically Produced Dried Banana Chips	Organically Produced Dried Banana Chips	Dried Banana Chips				
ug/kg whole weight		%U	%U	%U				
acenaphthylene	<0.38	201	2.96	40	2.20	22	0.65	32
acenaphthene	<0.75	201	1.27	104	0.29	181	<0.45	201
fluorene	<0.8	201	2.02	80	1.15	64	1.52	65
phenanthrene	1.41	110	6.36	52	5.09	28	14.47	22
anthracene	0.08	151	0.82	22	0.99	23	2.22	22
fluoranthene	3.72	27	3.98	31	8.67i	22	9.24	22
benzo[c]fluorene	<0.02	201	0.41	22	0.64	21	0.52	21
pyrene	6.09	26	5.10	27	11.9i	21	8.65	23
benzo[ghi]fluoranthene	0.76	18	0.81	17	1.44	16	0.96	18
benz (a) anthracene	0.07	172	0.59	16	0.69	17	0.68	20
benzo[b]naphtho[2,1-d]thiophene	<0.01	201	<0.02	201	<0.02	201	<0.02	201
cyclopenta[c,d]pyrene	0.23	18	0.45	16	0.50	16	0.16	20
chrysene	<0.08	201	0.83	20	0.87	18	0.85	20
5-methylchrysene	<0.01	201	<0.02	201	0.02	101	0.02	101
benzo[b]fluoranthene	0.24	37	0.26	56	0.32	36	0.17	50
benzo[jj]fluoranthene	0.07	60	<0.1	201	0.13	23	0.10	26
benzo[k]fluoranthene	0.10	43	0.06	134	0.07	172	0.06	37
benzo[e]pyrene	0.22	48	0.21	19	0.36	18	0.19	27
benzo[a]pyrene	0.23	72	0.27	90	0.31	73	<0.11	201
indeno[1,2,3-cd]pyrene	0.21	69	<0.12	201	0.42	21	0.09	112
dibenz[ah]anthracene	<0.07	201	<0.03	201	<0.04	201	<0.05	201
benzo-[g,h,i]perylene	0.33	29	0.14	21	0.63	17	0.11	40
anthanthrene	<0.1	201	<0.1	201	<0.1	201	<0.1	201
dibenzo[a,l]pyrene	<0.1	201	<0.1	201	<0.1	201	<0.1	201
dibenzo[a,e]pyrene	<0.12	201	<0.1	201	<0.1	201	<0.1	201
dibenzo[a,i]pyrene	<0.1	201	<0.1	201	<0.1	201	<0.1	201
dibenzo[a,h]pyrene	<0.1	201	<0.1	201	<0.1	201	<0.1	201
coronene	<0.1	201	<0.1	201	0.20	101	<0.1	201
PAH 4 Sum Lower ug/kg	0.54		1.95		2.19		1.70	
PAH 4 Sum Upper ug/kg	0.62	133	1.95	30	2.19	23	1.81	41

OEC Sample No.	22263	22352	21671	22113				
FERA LIMS No.	S14-009515	S14-009764	S13-049164	S13-063196	Crunchy Oat Granola Tropical Fruits			
Description	Dried Banana Chips	Organic Banana Chips	Organic Banana Chips					
ug/kg whole weight	%U	%U	%U	%U	%U			
acenaphthylene	1.13	91	18.38	21	9.05	21	1.00	79
acenaphthene	1.08	122	2.14	45	2.31	31	<0.47	201
fluorene	2.47	67	15.07	22	11.61	22	2.90	41
phenanthrene	35.25	23	119.37i	21	51.91i	21	30.74	21
anthracene	6.44	21	27.24	21	8.43	21	3.85	21
fluoranthene	23.98	21	61.33i	21	14.45i	21	14.78	21
benzo[c]fluorene	0.94	21	3.00	21	0.66	21	0.88	21
pyrene	24.07	21	61.52i	21	10.79i	22	12.46	21
benzo[ghi]fluoranthene	3.03	16	8.43	16	0.71	17	0.72	17
benz (a) anthracene	2.66	16	6.83	16	0.60	17	0.47	18
benzo[b]naphtho[2,1-d]thiophene	<0.06	201	<0.24	201	<0.04	201	<0.02	201
cyclopenta[c,d]pyrene	0.69	16	4.44	16	0.32	17	0.35	17
chrysene	3.51	16	8.09	16	0.75	19	0.66	22
5-methylchrysene	<0.09	201	<0.12	201	<0.01	201	0.01	201
benzo[b]fluoranthene	0.89	23	1.41	18	0.12	85	<0.09	201
benzo[jj]fluoranthene	0.49	17	1.01	21	0.08	30	0.06	37
benzo[k]fluoranthene	0.23	39	0.41	38	<0.06	201	0.03	134
benzo[e]pyrene	0.89	17	1.63	18	0.12	24	0.10	43
benzo[a]pyrene	0.73	37	0.94	21	<0.11	201	<0.1	201
indeno[1,2,3-cd]pyrene	0.33	24	0.24	45	<0.04	201	<0.04	201
dibenz[ah]anthracene	<0.04	201	<0.05	201	<0.04	201	<0.05	201
benzo-[g,h,i]perylene	0.49	16	0.32	35	<0.04	201	<0.03	201
anthanthrene	<0.1	201	<0.1	201	<0.1	201	<0.1	201
dibenzo[a,l]pyrene	<0.1	201	<0.1	201	<0.1	201	<0.1	201
dibenzo[a,e]pyrene	<0.1	201	<0.1	201	<0.1	201	<0.1	201
dibenzo[a,i]pyrene	<0.1	201	<0.1	201	<0.1	201	<0.1	201
dibenzo[a,h]pyrene	<0.1	201	<0.1	201	<0.1	201	<0.1	201
coronene	<0.1	201	<0.1	201	<0.1	201	<0.1	201
PAH 4 Sum Lower ug/kg	7.79		17.27		1.47		1.13	
PAH 4 Sum Upper ug/kg	7.79	7	17.27	4	1.58	48	1.32	68

OEC Sample No.	22114	21653	22078	21557				
FERA LIMS No.	S13-063197	S13-048821	S13-060103	S13-045691				
Description	Crunchy Oat Granola Fruit & Nut	Banana Chips	Banana Chips	Banana Chips				
ug/kg whole weight	%U	%U	%U	%U				
acenaphthylene	1.21	66	5.44	21	0.61	159	1.00	26
acenaphthene	0.49	193	0.67	136	<0.58	201	<0.62	201
fluorene	3.26	38	6.98	25	1.47	76	1.74	79
phenanthrene	36.77	21	102.58	21	25.46	22	26.64	22
anthracene	4.38	21	29.43	21	28.00	21	4.27	21
fluoranthene	16.61	21	69.50	21	19.4i	21	15.98	21
benzo[c]fluorene	0.98	21	3.37	21	0.88	22	0.97	21
pyrene	14.47	21	74.79	21	17.32i	22	14.00	22
benzo[ghi]fluoranthene	0.82	17	9.39	16	1.95	17	1.48	17
benz (a) anthracene	0.46	18	11.11	16	2.35	16	0.97	16
benzo[b]naphtho[2,1-d]thiophene	<0.02	201	<0.11	201	<0.04	201	<0.03	201
cyclopenta[c,d]pyrene	0.30	17	6.24	16	0.66	16	0.13	22
chrysene	0.74	21	13.64	16	3.10	16	1.34	17
5-methylchrysene	<0.01	201	<0.07	201	<0.08	201	0.02	101
benzo[b]fluoranthene	<0.09	201	2.19	17	0.63	33	0.22	75
benzo[jj]fluoranthene	0.07	33	1.58	17	0.40	18	0.14	22
benzo[k]fluoranthene	0.04	101	0.55	17	0.16	65	<0.09	201
benzo[e]pyrene	0.10	43	2.07	17	0.64	18	0.27	18
benzo[a]pyrene	<0.1	201	1.39	23	0.48	49	0.12	134
indeno[1,2,3-cd]pyrene	<0.04	201	0.25	36	0.20	43	<0.08	201
dibenz[ah]anthracene	<0.05	201	<0.06	201	<0.05	201	<0.07	201
benzo-[g,h,i]perylene	<0.03	201	0.29	21	0.28	27	<0.06	201
anthanthrene	<0.1	201	<0.1	201	<0.1	201	<0.1	201
dibenzo[a,l]pyrene	<0.1	201	<0.1	201	<0.1	201	<0.1	201
dibenzo[a,e]pyrene	<0.1	201	<0.1	201	<0.1	201	<0.11	201
dibenzo[a,i]pyrene	<0.1	201	<0.1	201	<0.1	201	<0.1	201
dibenzo[a,h]pyrene	<0.1	201	<0.1	201	<0.1	201	<0.1	201
coronene	<0.1	201	<0.1	201	<0.1	201	<0.1	201
PAH 4 Sum Lower ug/kg	1.20		28.33		6.56		2.65	
PAH 4 Sum Upper ug/kg	1.39	65	28.33	3	6.56	9	2.65	24

OEC Sample No.	21639	21640	22121	22122				
FERA LIMS No.	S13-047894	S13-047895	S13-063209	S13-063210				
Description	Kenyan Banana Rounds (Matoke) Unsalted.	Kenyan Banana Rounds (Matoke)	Muesli Luxury Fruit & Nut	Muesli Luxury Fruit				
ug/kg whole weight	%U	%U	%U	%U	%U	%U		
acenaphthylene	<0.48	201	0.49	197	1.36	76	2.55	27
acenaphthene	<0.58	201	<0.58	201	1.02	129	0.57	198
fluorene	0.68	160	0.82	133	1.92	84	2.22	50
phenanthrene	5.52	32	7.80	27	11.87	33	25.07	22
anthracene	0.70	33	0.99	28	2.01	21	5.72	21
fluoranthene	3.49	31	3.84	29	8.79	23	38.58i	21
benzo[c]fluorene	0.12	39	0.17	32	0.79	21	3.07	21
pyrene	3.06	34	3.17	33	8.77	23	32.92i	21
benzo[ghi]fluoranthene	0.54	24	0.53	25	2.09	16	6.57	16
benz (a) anthracene	0.66	18	0.71	18	2.25	16	11.42	16
benzo[b]naphtho[2,1-d]thiophene	0.75	16	0.76	16	<0.06	201	<0.22	201
cyclopenta[c,d]pyrene	0.03	69	0.12	23	0.69	16	1.64	16
chrysene	1.00	20	1.01	20	3.07	16	14.55	16
5-methylchrysene	<0.01	201	<0.01	201	<0.07	201	<0.14	201
benzo[b]fluoranthene	0.42	46	0.42	46	0.70	26	3.04	18
benzo[jj]fluoranthene	0.22	19	0.25	19	0.41	18	2.13	17
benzo[k]fluoranthene	0.18	58	0.18	58	0.20	43	1.05	18
benzo[e]pyrene	0.48	19	0.49	19	0.70	17	2.84	17
benzo[a]pyrene	0.35	65	0.36	63	0.59	44	2.26	18
indeno[1,2,3-cd]pyrene	0.31	30	0.31	30	0.14	46	0.50	25
dibenz[ah]anthracene	<0.08	201	<0.08	201	<0.04	201	<0.1	201
benzo-[g,h,i]perylene	0.36	23	0.36	23	0.17	20	0.51	22
anthanthrene	<0.1	201	<0.1	201	<0.1	201	<0.1	201
dibenzo[a,l]pyrene	<0.1	201	<0.1	201	<0.1	201	<0.1	201
dibenzo[a,e]pyrene	<0.1	201	<0.1	201	<0.1	201	<0.1	201
dibenzo[a,i]pyrene	<0.1	201	<0.1	201	<0.1	201	<0.1	201
dibenzo[a,h]pyrene	<0.1	201	<0.1	201	<0.1	201	<0.1	201
coronene	0.13	155	0.13	155	<0.1	201	<0.1	201
PAH 4 Sum Lower ug/kg	2.43		2.50		6.61		31.27	
PAH 4 Sum Upper ug/kg	2.43	22	2.50	22	6.61	8	31.27	3

OEC Sample No.	22125	22126	22127	22128				
FERA LIMS No.	S13-063213	S13-063214	S13-063215	S13-063216				
Description	Fruit & Nut Muesli	Muesli 55% added Fruit	Fruit & Fibre	Wholewheat Muesli				
ug/kg whole weight	%U	%U	%U	%U	%U			
acenaphthylene	0.48	90	0.50	87	0.85	54	0.55	33
acenaphthene	<0.55	201	<0.56	201	0.65	174	<0.42	201
fluorene	0.49	201	0.70	144	1.30	78	0.60	145
phenanthrene	3.44	45	1.62	88	11.90	24	2.28	60
anthracene	0.63	25	0.37	34	2.61	21	0.39	29
fluoranthene	2.78i	40	1.72i	61	9.36i	23	1.94i	55
benzo[c]fluorene	0.08	33	0.23	23	0.61	21	0.34	22
pyrene	3.03i	36	2.17i	47	9.04i	23	1.62i	94
benzo[ghi]fluoranthene	0.35	38	0.35	38	1.51	18	0.30	56
benz (a) anthracene	0.27	40	0.39	30	1.69	17	0.37	31
benzo[b]naphtho[2,1-d]thiophene	<0.04	201	<0.07	201	<0.04	201	<0.02	201
cyclopenta[c,d]pyrene	0.03	69	0.11	24	0.26	18	0.23	18
chrysene	0.36	37	0.47	30	2.11	17	0.50	25
5-methylchrysene	0.01	201	0.02	101	<0.01	201	0.01	201
benzo[b]fluoranthene	0.13	155	<0.1	201	0.45	48	0.09	112
benzo[j]fluoranthene	0.08	30	0.07	33	0.27	18	0.05	43
benzo[k]fluoranthene	<0.08	201	0.04	151	0.16	41	<0.06	201
benzo[e]pyrene	0.16	53	0.08	101	0.52	23	0.09	69
benzo[a]pyrene	0.14	87	0.07	172	0.34	39	<0.06	201
indeno[1,2,3-cd]pyrene	0.12	85	<0.05	201	0.20	52	<0.04	201
dibenz[ah]anthracene	<0.04	201	<0.04	201	<0.04	201	<0.04	201
benzo-[g,h,i]perylene	0.17	50	<0.04	201	0.27	34	<0.06	201
anthanthrene	<0.1	201	<0.1	201	<0.1	201	<0.1	201
dibenzo[a,l]pyrene	<0.1	201	<0.1	201	<0.1	201	<0.1	201
dibenzo[a,e]pyrene	<0.1	201	<0.1	201	<0.1	201	<0.1	201
dibenzo[a,i]pyrene	<0.1	201	<0.1	201	<0.1	201	<0.1	201
dibenzo[a,h]pyrene	<0.1	201	<0.1	201	<0.1	201	<0.1	201
coronene	<0.1	201	<0.1	201	<0.1	201	<0.1	201
PAH 4 Sum Lower ug/kg	0.90		0.93		4.59		0.96	
PAH 4 Sum Upper ug/kg	0.90	79	1.03	81	4.59	11	1.02	64

OEC Sample No.	22408	21667	22034	21545				
FERA LIMS No.	S14-009863	S13-049138	S13-058736	S13-045536				
Description	Fruit and Flake	Dried Honey Dipped Bananas	Honey Dipped Banana Chips	Banana Chips				
ug/kg whole weight	%U	%U	%U	%U				
acenaphthylene	11.55	21	2.28	25	2.89	39	1.31	62
acenaphthene	1.63	56	<0.55	201	<0.58	201	<0.74	201
fluorene	13.39	22	1.15	95	3.37	38	1.06	151
phenanthrene	102.17i	21	11.78	23	33.86	21	2.75	58
anthracene	19.52	21	2.77	21	7.34	21	0.60	29
fluoranthene	51.36i	21	24.59	21	29.77i	21	2.48	33
benzo[c]fluorene	2.51	21	2.15	21	1.54	21	0.77	21
pyrene	48.71i	21	22.20	21	26.58i	21	4.07	30
benzo[ghi]fluoranthene	5.81	16	4.60	16	4.12	16	0.83	17
benz (a) anthracene	3.65	16	6.48	16	3.96	16	0.49	29
benzo[b]naphtho[2,1-d]thiophene	<0.11	201	<0.1	201	<0.16	201	<0.03	201
cyclopenta[c,d]pyrene	3.03	16	2.73	16	3.25	16	0.12	23
chrysene	4.30	16	8.45	16	5.02	16	0.58	32
5-methylchrysene	<0.04	201	0.05	43	<0.05	201	<0.01	201
benzo[b]fluoranthene	0.73	22	1.72	20	1.04	24	0.16	53
benzo[j]fluoranthene	0.49	30	1.17	17	0.70	17	0.08	53
benzo[k]fluoranthene	0.21	69	0.47	27	0.30	37	0.07	60
benzo[e]pyrene	0.88	20	1.59	17	1.05	17	0.11	92
benzo[a]pyrene	0.51	29	1.23	25	0.78	33	0.11	146
indeno[1,2,3-cd]pyrene	0.14	73	0.32	30	0.29	32	<0.09	201
dibenz[ah]anthracene	<0.05	201	<0.06	201	<0.05	201	<0.07	201
benzo-[g,h,i]perylene	0.20	52	0.37	19	0.39	22	<0.06	201
anthanthrene	<0.1	201	<0.1	201	<0.1	201	<0.1	201
dibenzo[a,l]pyrene	<0.1	201	<0.1	201	<0.1	201	<0.1	201
dibenzo[a,e]pyrene	<0.1	201	<0.1	201	<0.1	201	<0.12	201
dibenzo[a,i]pyrene	<0.1	201	<0.1	201	<0.1	201	<0.1	201
dibenzo[a,h]pyrene	<0.1	201	<0.1	201	<0.1	201	<0.1	201
coronene	<0.1	201	<0.1	201	<0.1	201	<0.1	201
PAH 4 Sum Lower ug/kg	9.19		17.88		10.80		1.34	
PAH 4 Sum Upper ug/kg	9.19	6	17.88	4	10.80	6	1.34	46

OEC Sample No.	21546	21552	21553	21555
FERA LIMS No.	S13-045537	S13-045670	S13-045671	S13-045688
Description	Sun Dried Bananas	Banana Chips	Banana Chips coated in Chocolate and Yoghurt	Super Trail Mix 20% Bananas
ug/kg whole weight		%U	%U	%U
acenaphthylene	<0.38	201	1.02	77
acenaphthene	<0.74	201	<0.75	201
fluorene	<0.79	201	0.82	194
phenanthrene	<0.75	201	7.91	28
anthracene	<0.06	201	1.67	22
fluoranthene	<0.31	201	6.80	23
benzo[c]fluorene	<0.01	201	0.54	21
pyrene	<0.44	201	8.14	24
benzo[ghi]fluoranthene	0.07	87	1.46	16
benz (a) anthracene	<0.06	201	1.17	19
benzo[b]naphtho[2,1-d]thiophene	<0.02	201	<0.03	201
cyclopenta[c,d]pyrene	<0.01	201	0.50	16
chrysene	<0.08	201	1.48	19
5-methylchrysene	<0.01	201	<0.04	201
benzo[b]fluoranthene	0.07	116	0.37	27
benzo[j]fluoranthene	0.03	134	0.22	25
benzo[k]fluoranthene	0.05	82	0.13	35
benzo[e]pyrene	<0.05	201	0.42	29
benzo[a]pyrene	<0.08	201	0.27	62
indeno[1,2,3-cd]pyrene	<0.07	201	0.15	95
dibenz[ah]anthracene	<0.07	201	<0.07	201
benzo-[g,h,i]perylene	<0.04	201	0.21	41
anthanthrene	<0.1	201	<0.1	201
dibenzo[a,l]pyrene	<0.1	201	<0.1	201
dibenzo[a,e]pyrene	<0.12	201	<0.12	201
dibenzo[a,i]pyrene	<0.1	201	<0.1	201
dibenzo[a,h]pyrene	<0.1	201	<0.1	201
coronene	<0.1	201	<0.1	201
PAH 4 Sum Lower ug/kg	0.07		3.29	1.22
PAH 4 Sum Upper ug/kg	0.29	341	3.29	14
			1.22	2.06
			50	26

OEC Sample No.	22281	22282	22283	22284				
FERA LIMS No.	S14-009662	S14-009663	S14-009664	S14-009665				
Description	Wholefoods, Super Trail Mix	Banana Chips coated in Milk Chocolate & Yogurt Flavor Coating	Assorted Chocolate Banana	Banana Chips				
ug/kg whole weight	%U	%U	%U	%U				
acenaphthylene	1.44	73	1.33	78	1.32	79	17.55	22
acenaphthene	0.86	153	1.78	76	2.38	59	2.64	54
fluorene	1.26	126	1.84	87	2.31	72	22.11	22
phenanthrene	4.05	77	7.69	44	10.97	34	174.51	21
anthracene	0.42	25	0.84	22	1.13	22	37.22	21
fluoranthene	2.59	41	3.58	33	4.56	29	85.94	21
benzo[c]fluorene	0.58	21	0.34	22	0.37	22	4.85	21
pyrene	4.38	28	3.92	30	4.69	28	<66.33	201
benzo[ghi]fluoranthene	1.09	17	0.66	18	0.80	18	8.99	16
benz (a) anthracene	0.52	16	0.58	16	0.64	16	6.56	16
benzo[b]naphtho[2,1-d]thiophene	<0.03	201	<0.09	201	<0.05	201	<0.13	201
cyclopenta[c,d]pyrene	0.21	18	0.21	18	0.25	18	4.82	16
chrysene	0.63	22	0.83	20	0.90	19	8.00	16
5-methylchrysene	0.02	101	0.02	101	<0.02	201	<0.24	201
benzo[b]fluoranthene	0.20	72	0.30	50	0.34	45	1.50	19
benzo[jj]fluoranthene	<0.07	201	0.14	22	0.19	20	0.95	17
benzo[k]fluoranthene	<0.06	201	0.07	116	0.08	101	0.39	27
benzo[e]pyrene	0.16	21	0.28	18	0.25	19	1.70	17
benzo[a]pyrene	0.21	116	0.28	87	0.31	79	0.99	30
indeno[1,2,3-cd]pyrene	<0.1	201	<0.12	201	<0.13	201	0.26	28
dibenz[ah]anthracene	<0.03	201	<0.03	201	<0.03	201	<0.04	201
benzo-[g,h,i]perylene	0.10	25	0.13	22	0.12	23	0.35	17
anthanthrene	<0.1	201	<0.1	201	<0.1	201	<0.1	201
dibenzo[a,l]pyrene	<0.1	201	<0.1	201	<0.1	201	<0.1	201
dibenzo[a,e]pyrene	<0.1	201	<0.1	201	<0.1	201	<0.1	201
dibenzo[a,i]pyrene	<0.1	201	<0.1	201	<0.1	201	<0.1	201
dibenzo[a,h]pyrene	<0.1	201	<0.1	201	<0.1	201	<0.1	201
coronene	<0.1	201	<0.1	201	<0.1	201	<0.1	201
PAH 4 Sum Lower ug/kg	1.56		1.99		2.19		17.05	
PAH 4 Sum Upper ug/kg	1.56	42	1.99	29	2.19	26	17.05	4

OEC Sample No.	21635	21550	21551	21554
FERA LIMS No.	S13-047890	S13-045668	S13-045669	S13-045672
Description	Banana Chips	Banana Chips	Organic Banana Chips	Toasted Coconut Chips
ug/kg whole weight				
acenaphthylene	1.16	29	2.42	38
acenaphthene	<0.36	201	<0.74	201
fluorene	0.65	119	1.17	137
phenanthrene	3.06	39	6.77	31
anthracene	0.49	24	1.37	23
fluoranthene	1.55	45	8.71	22
benzo[c]fluorene	0.03	70	0.92	21
pyrene	1.07	55	10.53	23
benzo[ghi]fluoranthene	0.20	25	1.63	16
benz (a) anthracene	0.24	37	1.09	19
benzo[b]naphtho[2,1-d]thiophene	0.04	101	<0.03	201
cyclopenta[c,d]pyrene	0.08	30	0.74	16
chrysene	0.27	54	1.58	19
5-methylchrysene	<0.01	201	<0.01	201
benzo[b]fluoranthene	0.21	87	0.39	27
benzo[j]fluoranthene	0.12	24	0.19	27
benzo[k]fluoranthene	0.11	75	0.12	37
benzo[e]pyrene	0.25	29	0.41	30
benzo[a]pyrene	0.19	127	0.33	51
indeno[1,2,3-cd]pyrene	0.18	47	0.23	63
dibenz[ah]anthracene	<0.05	201	<0.07	201
benzo-[g,h,i]perylene	0.25	22	0.32	30
anthanthrene	<0.1	201	<0.1	201
dibenzo[a,l]pyrene	<0.1	201	<0.1	201
dibenzo[a,e]pyrene	<0.1	201	<0.12	201
dibenzo[a,i]pyrene	<0.1	201	<0.1	201
dibenzo[a,h]pyrene	<0.1	201	<0.1	201
coronene	0.12	167	<0.1	201
PAH 4 Sum Lower ug/kg	0.91		3.39	1.83
PAH 4 Sum Upper ug/kg	0.91	84	3.39	14
			1.83	28
			0.68	86

OEC Sample No.	22097	22096	22109	22111				
FERA LIMS No.	S13-061747	S13-061746	S13-063173	S13-063185				
Description	Organic Organically Produced Banana Chips	Honey Dipped Banana Chips	Wholegrain Fruit & Fibre	Tropical Granola				
ug/kg whole weight	%U	%U	%U	%U	%U			
acenaphthylene	3.39	32	<0.48	201	1.39	59	1.79	47
acenaphthene	0.58	184	<0.58	201	0.97	97	<0.46	201
fluorene	1.28	79	0.80	137	3.59	35	0.88	118
phenanthrene	4.04	36	2.66	55	38.73	21	3.99	35
anthracene	0.93	24	0.59	37	4.17	21	0.68	23
fluoranthene	5.20	25	2.05	43	16.32	21	3.25	28
benzo[c]fluorene	0.82	22	0.31	25	0.96	21	0.31	22
pyrene	5.15	25	2.28	42	13.82	21	4.15	25
benzo[ghi]fluoranthene	0.76	18	0.48	26	0.81	17	0.62	17
benz (a) anthracene	0.69	18	0.76	18	0.42	18	0.48	18
benzo[b]naphtho[2,1-d]thiophene	<0.02	201	<0.06	201	<0.03	201	<0.02	201
cyclopenta[c,d]pyrene	0.58	16	0.34	17	0.27	17	0.33	17
chrysene	0.85	21	0.91	21	0.63	22	0.63	22
5-methylchrysene	<0.02	201	<0.01	201	<0.02	201	<0.02	201
benzo[b]fluoranthene	0.11	165	0.28	66	0.10	181	0.14	130
benzo[jj]fluoranthene	0.08	30	0.16	21	<0.07	201	<0.12	201
benzo[k]fluoranthene	<0.06	201	0.12	85	<0.06	201	<0.07	201
benzo[e]pyrene	0.12	37	0.29	22	0.13	35	0.17	29
benzo[a]pyrene	<0.11	201	0.26	86	<0.1	201	0.12	168
indeno[1,2,3-cd]pyrene	<0.05	201	0.14	59	<0.07	201	<0.09	201
dibenz[ah]anthracene	<0.05	201	<0.05	201	<0.05	201	<0.05	201
benzo-[g,h,i]perylene	<0.04	201	0.14	46	<0.09	201	<0.1	201
anthanthrene	<0.1	201	<0.1	201	<0.1	201	<0.1	201
dibenzo[a,l]pyrene	<0.1	201	<0.1	201	<0.1	201	<0.1	201
dibenzo[a,e]pyrene	<0.1	201	<0.1	201	<0.1	201	<0.1	201
dibenzo[a,i]pyrene	<0.1	201	<0.1	201	<0.1	201	<0.1	201
dibenzo[a,h]pyrene	<0.1	201	<0.1	201	<0.1	201	<0.1	201
coronene	<0.1	201	<0.1	201	<0.1	201	<0.1	201
PAH 4 Sum Lower ug/kg	1.65		2.21		1.15		1.37	
PAH 4 Sum Upper ug/kg	1.76	51	2.21	28	1.25	70	1.37	57

OEC Sample No.	22112	21562	22110	21510				
FERA LIMS No.	S13-063186	S13-045864	S13-063184	S13-045454				
Description	Banana, Date & Coconut Muesli	Banana Coins	Breakfast Muesli	Plantain Chips Sweet				
ug/kg whole weight		%U	%U	%U				
acenaphthylene	0.63	122	<0.11	201	0.91	86	<0.08	201
acenaphthene	<0.46	201	<0.63	201	<0.46	201	<0.64	201
fluorene	0.59	174	<0.67	201	1.14	92	<0.69	201
phenanthrene	3.80	36	<0.71	201	12.05	23	1.72	86
anthracene	0.65	23	0.04	151	2.35	21	0.09	70
fluoranthene	3.82	26	<0.31	201	10.84	22	2.26	35
benzo[c]fluorene	0.27	22	<0.02	201	0.45	21	<0.03	201
pyrene	5.43	23	0.48	172	11.31	22	3.45	32
benzo[ghi]fluoranthene	0.97	16	0.05	161	1.44	16	0.42	25
benz (a) anthracene	0.41	19	0.04	101	1.39	16	0.05	82
benzo[b]naphtho[2,1-d]thiophene	<0.03	201	<0.01	201	<0.04	201	0.04	52
cyclopenta[c,d]pyrene	0.22	18	<0.01	201	0.50	16	0.12	23
chrysene	0.54	24	0.04	201	1.87	17	0.10	82
5-methylchrysene	<0.02	201	<0.01	201	<0.06	201	<0.01	201
benzo[b]fluoranthene	0.18	101	<0.09	201	0.45	43	0.18	101
benzo[jj]fluoranthene	0.08	30	0.03	69	0.29	18	0.06	37
benzo[k]fluoranthene	0.06	69	<0.09	201	0.14	33	<0.09	201
benzo[e]pyrene	0.34	21	0.03	69	0.51	19	0.23	19
benzo[a]pyrene	0.20	101	<0.08	201	0.39	54	0.18	90
indeno[1,2,3-cd]pyrene	0.18	47	<0.06	201	0.24	37	0.22	57
dibenz[ah]anthracene	<0.05	201	<0.07	201	<0.05	201	<0.08	201
benzo-[g,h,i]perylene	0.23	24	<0.04	201	0.33	20	0.32	20
anthanthrene	<0.1	201	<0.1	201	<0.1	201	<0.1	201
dibenzo[a,l]pyrene	<0.1	201	<0.1	201	<0.1	201	<0.1	201
dibenzo[a,e]pyrene	<0.1	201	<0.11	201	<0.1	201	<0.11	201
dibenzo[a,i]pyrene	<0.1	201	<0.1	201	<0.1	201	<0.1	201
dibenzo[a,h]pyrene	<0.1	201	<0.1	201	<0.1	201	<0.1	201
coronene	<0.1	201	<0.1	201	<0.1	201	0.14	144
PAH 4 Sum Lower ug/kg	1.33		0.08		4.10		0.51	
PAH 4 Sum Upper ug/kg	1.33	50	0.25	377	4.10	13	0.51	129

OEC Sample No.	21631	22191	21661	21666				
FERA LIMS No.	S13-047886	S13-065629	S13-049105	S13-049137				
Description	Mari Kela Wafe with Black Pepper	Banana Chips	Yoghurt Banana Chips	Banana Chips				
ug/kg whole weight	%U	%U	%U	%U				
acenaphthylene	0.52	51	1.88	58	0.58	59	1.86	27
acenaphthene	0.64	114	0.89	174	<0.54	201	1.62	71
fluorene	1.91	45	1.60	133	1.28	84	2.56	46
phenanthrene	4.15	32	4.69	87	9.66	24	6.98	26
anthracene	0.45	25	0.60	29	1.16	22	1.17	22
fluoranthene	1.36	50	2.84	45	4.48	23	3.80	24
benzo[c]fluorene	0.04	54	0.32	201	0.20	23	0.68	21
pyrene	0.99	58	3.05	22	4.48	25	4.33	25
benzo[ghi]fluoranthene	0.20	25	0.47	18	0.30	25	0.77	18
benz (a) anthracene	0.15	56	0.43	16	<0.18	201	0.83	17
benzo[b]naphtho[2,1-d]thiophene	0.07	59	<0.01	201	<0.01	201	<0.02	201
cyclopenta[c,d]pyrene	0.04	52	0.10	25	0.09	27	0.41	17
chrysene	0.20	72	0.53	22	0.26	35	1.04	17
5-methylchrysene	<0.01	201	0.01	201	<0.01	201	<0.01	201
benzo[b]fluoranthene	0.16	114	0.11	57	<0.09	201	0.17	107
benzo[jj]fluoranthene	0.10	26	0.07	33	0.03	69	0.12	24
benzo[k]fluoranthene	0.07	116	0.03	69	<0.05	201	<0.08	201
benzo[e]pyrene	0.15	43	0.14	22	0.06	37	0.19	20
benzo[a]pyrene	<0.12	201	0.07	144	<0.1	201	0.12	184
indeno[1,2,3-cd]pyrene	<0.09	201	<0.05	201	<0.05	201	<0.06	201
dibenz[ah]anthracene	<0.05	201	<0.03	201	<0.04	201	<0.04	201
benzo-[g,h,i]perylene	0.12	37	0.04	52	<0.05	201	<0.05	201
anthanthrene	<0.1	201	<0.1	201	<0.1	201	<0.1	201
dibenzo[a,l]pyrene	<0.1	201	<0.1	201	<0.1	201	<0.1	201
dibenzo[a,e]pyrene	<0.1	201	<0.1	201	<0.1	201	<0.1	201
dibenzo[a,i]pyrene	<0.1	201	<0.1	201	<0.1	201	<0.1	201
dibenzo[a,h]pyrene	<0.1	201	<0.1	201	<0.1	201	<0.1	201
coronene	<0.1	201	<0.1	201	<0.1	201	<0.1	201
PAH 4 Sum Lower ug/kg	0.51		1.14		0.26		2.16	
PAH 4 Sum Upper ug/kg	0.63	145	1.14	41	0.63	196	2.16	37

OEC Sample No.	21665	22033	22266	22115
FERA LIMS No.	S13-049109	S13-058726	S14-009518	S13-063203
Description	Sweetened Banana Chips	Sweetened Banana Chips	Organic Sweetened Banana Chips	Fruit & Fibre
ug/kg whole weight		%U	%U	%U
acenaphthylene	3.77	23	6.66	25
acenaphthene	<0.55	201	1.09	108
fluorene	4.07	33	5.65	28
phenanthrene	45.97	21	41.08	21
anthracene	10.04	21	9.37	21
fluoranthene	38.57	21	41.97i	21
benzo[c]fluorene	1.91	21	2.17	21
pyrene	31.14	21	35.97i	21
benzo[ghi]fluoranthene	4.84	16	6.84	16
benz (a) anthracene	4.93	16	10.55	16
benzo[b]naphtho[2,1-d]thiophene	<0.18	201	<0.14	201
cyclopenta[c,d]pyrene	3.21	16	5.58	16
chrysene	6.16	16	13.81	16
5-methylchrysene	0.03	69	<0.13	201
benzo[b]fluoranthene	1.21	23	3.22	18
benzo[jj]fluoranthene	0.83	17	2.17	17
benzo[k]fluoranthene	0.34	34	1.02	20
benzo[e]pyrene	1.21	17	2.69	17
benzo[a]pyrene	0.87	29	2.50	19
indeno[1,2,3-cd]pyrene	0.22	40	0.82	19
dibenz[ah]anthracene	<0.05	201	<0.1	201
benzo-[g,h,i]perylene	0.29	21	1.01	17
anthanthrene	<0.1	201	0.20	101
dibenzo[a,l]pyrene	<0.1	201	<0.1	201
dibenzo[a,e]pyrene	<0.1	201	<0.1	201
dibenzo[a,i]pyrene	<0.1	201	<0.1	201
dibenzo[a,h]pyrene	<0.1	201	<0.1	201
coronene	<0.1	201	0.23	88
PAH 4 Sum Lower ug/kg	13.17		30.08	2.20
PAH 4 Sum Upper ug/kg	13.17	5	30.08	3
			2.20	26
			4.45	13

OEC Sample No.	22130	22131	21509	22116				
FERA LIMS No.	S13-063218	S13-063219	S13-045453	S13-063204				
Description	Fruit & Nut Muesli	Fruit & Nut Granola	Tropical Mix	Fruit & Fibre				
ug/kg whole weight		%U	%U	%U				
acenaphthylene	1.36	23	0.33	47	0.87	28	3.06	33
acenaphthene	0.47	180	0.54	168	<0.64	201	0.73	128
fluorene	0.92	96	0.60	155	<0.68	201	5.00	29
phenanthrene	4.13	37	1.90	76	3.02	52	41.83	21
anthracene	0.61	25	0.35	31	0.45	25	5.13	21
fluoranthene	2.7i	41	1.87i	59	4.26	26	15.62	21
benzo[c]fluorene	0.26	22	0.36	22	0.31	22	0.86	21
pyrene	2.93i	55	1.56i	105	6.01	25	13.79	21
benzo[ghi]fluoranthene	0.54	34	0.30	62	0.77	19	0.60	17
benz (a) anthracene	0.44	28	0.38	31	0.37	19	0.37	19
benzo[b]naphtho[2,1-d]thiophene	<0.03	201	<0.02	201	<0.02	201	<0.02	201
cyclopenta[c,d]pyrene	0.25	18	0.22	18	0.30	17	0.28	17
chrysene	0.62	23	0.47	27	0.52	22	0.49	26
5-methylchrysene	<0.01	201	<0.01	201	<0.01	201	<0.01	201
benzo[b]fluoranthene	0.14	73	0.08	126	0.18	101	<0.09	201
benzo[jj]fluoranthene	0.09	28	0.05	43	0.09	28	0.05	43
benzo[k]fluoranthene	<0.06	201	<0.07	201	<0.09	201	<0.05	201
benzo[e]pyrene	0.15	43	0.08	101	0.19	20	0.07	60
benzo[a]pyrene	0.11	110	<0.06	201	0.18	90	<0.1	201
indeno[1,2,3-cd]pyrene	<0.1	201	<0.05	201	<0.17	201	<0.04	201
dibenz[ah]anthracene	<0.04	201	<0.05	201	<0.08	201	<0.05	201
benzo-[g,h,i]perylene	0.10	121	<0.07	201	0.19	26	<0.03	201
anthanthrene	<0.1	201	<0.1	201	<0.1	201	<0.1	201
dibenzo[a,l]pyrene	<0.1	201	<0.1	201	<0.1	201	<0.1	201
dibenzo[a,e]pyrene	<0.1	201	<0.1	201	<0.11	201	<0.1	201
dibenzo[a,i]pyrene	<0.1	201	<0.1	201	<0.1	201	<0.1	201
dibenzo[a,h]pyrene	<0.1	201	<0.1	201	<0.1	201	<0.1	201
coronene	<0.1	201	<0.1	201	<0.1	201	<0.1	201
PAH 4 Sum Lower ug/kg	1.31		0.93		1.25		0.86	
PAH 4 Sum Upper ug/kg	1.31	40	0.99	67	1.25	49	1.05	86

OEC Sample No.	22129	22265	21624	21664
FERA LIMS No.	S13-063217	S14-009517	S13-047879	S13-049108
Description	Tropical Fruit & Nut Muesli	Organic Banana Chips	Banana Chips	Banana Chips
ug/kg whole weight		%U	%U	%U
acenaphthylene	0.70	29	3.41	36
acenaphthene	<0.42	201	1.08	122
fluorene	<0.43	201	1.79	91
phenanthrene	4.16	37	6.83	49
anthracene	0.57	25	0.97	22
fluoranthene	2.99i	39	8.51	24
benzo[c]fluorene	0.09	31	0.71	21
pyrene	2.64i	60	10.91	22
benzo[ghi]fluoranthene	0.32	52	1.33	16
benz (a) anthracene	0.30	37	0.74	16
benzo[b]naphtho[2,1-d]thiophene	<0.02	201	<0.04	201
cyclopenta[c,d]pyrene	0.05	43	0.66	16
chrysene	0.44	28	1.02	19
5-methylchrysene	0.01	201	<0.02	201
benzo[b]fluoranthene	0.16	65	0.33	46
benzo[jj]fluoranthene	0.08	30	0.13	23
benzo[k]fluoranthene	<0.06	201	0.08	101
benzo[e]pyrene	0.20	34	0.31	18
benzo[a]pyrene	0.14	87	0.36	69
indeno[1,2,3-cd]pyrene	0.13	64	0.19	35
dibenz[ah]anthracene	<0.04	201	<0.03	201
benzo-[g,h,i]perylene	0.18	69	0.27	17
anthanthrene	<0.1	201	<0.1	201
dibenzo[a,l]pyrene	<0.1	201	<0.1	201
dibenzo[a,e]pyrene	<0.1	201	<0.1	201
dibenzo[a,i]pyrene	<0.1	201	<0.1	201
dibenzo[a,h]pyrene	<0.1	201	<0.1	201
coronene	<0.1	201	<0.1	201
PAH 4 Sum Lower ug/kg	1.04		2.45	20.66
PAH 4 Sum Upper ug/kg	1.04	48	2.45	22
			20.66	4
			19.13	4

OEC Sample No.	21662	21663	21660	22264				
FERA LIMS No.	S13-049106	S13-049107	S13-049104	S14-009516				
Description	Yoghurt Coated Banana Chips	Organic Banana Chips	Banana Chips	Banana Chips				
ug/kg whole weight	%U	%U	%U	%U	%U			
acenaphthylene	0.24	135	3.77	23	2.74	22	1.35	77
acenaphthene	<0.55	201	0.62	179	0.41	158	1.02	129
fluorene	<0.52	201	1.34	82	1.55	55	1.88	86
phenanthrene	1.47	74	4.86	30	5.45	26	13.83	30
anthracene	0.20	37	0.98	22	1.10	21	1.74	21
fluoranthene	0.58	79	3.37	25	6.79i	22	8.95	23
benzo[c]fluorene	0.10	29	0.26	22	0.80	21	0.44	22
pyrene	0.70	85	4.36	25	8.34i	22	10.09	23
benzo[ghi]fluoranthene	0.28	27	0.82	17	1.29	16	1.33	16
benz (a) anthracene	<0.21	201	0.73	17	1.04	16	0.63	16
benzo[b]naphtho[2,1-d]thiophene	<0.02	201	<0.01	201	<0.02	201	<0.04	201
cyclopenta[c,d]pyrene	0.04	52	0.64	16	0.79	16	0.18	19
chrysene	0.25	36	0.92	17	1.35	17	0.88	19
5-methylchrysene	<0.01	201	<0.01	201	<0.01	201	<0.01	201
benzo[b]fluoranthene	<0.09	201	0.21	87	0.31	42	0.30	50
benzo[jj]fluoranthene	0.03	69	0.15	22	0.17	21	<0.13	201
benzo[k]fluoranthene	<0.05	201	0.06	168	0.09	112	0.06	134
benzo[e]pyrene	0.06	37	0.27	18	0.33	18	0.27	18
benzo[a]pyrene	<0.11	201	0.19	117	0.26	79	0.28	87
indeno[1,2,3-cd]pyrene	<0.04	201	0.11	74	0.15	56	0.12	52
dibenz[ah]anthracene	<0.04	201	<0.04	201	<0.05	201	<0.03	201
benzo-[g,h,i]perylene	<0.03	201	0.13	35	0.19	26	0.17	20
anthanthrene	<0.1	201	<0.1	201	<0.1	201	<0.1	201
dibenzo[a,l]pyrene	<0.1	201	<0.1	201	<0.1	201	<0.1	201
dibenzo[a,e]pyrene	<0.1	201	<0.1	201	<0.1	201	<0.1	201
dibenzo[a,i]pyrene	<0.1	201	<0.1	201	<0.1	201	<0.1	201
dibenzo[a,h]pyrene	<0.1	201	<0.1	201	<0.1	201	<0.1	201
coronene	<0.1	201	<0.1	201	<0.1	201	<0.1	201
PAH 4 Sum Lower ug/kg	0.25		2.05		2.96		2.09	
PAH 4 Sum Upper ug/kg	0.66	197	2.05	33	2.96	18	2.09	28

OEC Sample No.	21558	21544	22118	22119				
FERA LIMS No.	S13-045692	S13-045535	S13-063206	S13-063207				
Description	Dried Whole Banana	Banana Chips	Fruit & Fibre	Fruit Muesli				
ug/kg whole weight		%U	%U	%U				
acenaphthylene	<0.12	201	<0.38	201	1.67	66	1.75	32
acenaphthene	<0.63	201	<0.75	201	1.67	97	<0.56	201
fluorene	<0.67	201	<0.8	201	4.50	52	3.99	33
phenanthrene	1.15	125	<0.76	201	40.29	23	34.54i	21
anthracene	0.07	88	<0.06	201	3.46	21	4.23	21
fluoranthene	0.94	69	<0.31	201	16.38	22	15.7i	22
benzo[c]fluorene	0.02	102	<0.02	201	1.00	201	1.01	21
pyrene	1.11	77	<0.44	201	15.96	21	13.85i	22
benzo[ghi]fluoranthene	0.12	69	0.04	151	0.87	16	0.87	21
benz (a) anthracene	<0.07	201	<0.06	201	0.42	17	0.49	26
benzo[b]naphtho[2,1-d]thiophene	<0.02	201	<0.01	201	<0.03	201	<0.04	201
cyclopenta[c,d]pyrene	<0.02	201	<0.01	201	0.14	21	0.14	21
chrysene	0.15	56	<0.08	201	0.58	21	0.68	24
5-methylchrysene	<0.01	201	<0.01	201	0.01	201	<0.01	201
benzo[b]fluoranthene	<0.09	201	0.07	116	0.08	77	0.10	201
benzo[jj]fluoranthene	0.05	43	0.03	134	0.05	43	0.07	33
benzo[k]fluoranthene	<0.09	201	0.04	101	0.03	69	0.04	151
benzo[e]pyrene	0.05	43	<0.05	201	0.12	24	0.12	69
benzo[a]pyrene	<0.08	201	<0.08	201	<0.09	201	0.08	151
indeno[1,2,3-cd]pyrene	<0.06	201	<0.07	201	<0.03	201	<0.07	201
dibenz[ah]anthracene	<0.07	201	<0.07	201	<0.03	201	<0.04	201
benzo-[g,h,i]perylene	0.04	101	<0.05	201	0.03	69	0.06	134
anthanthrene	<0.1	201	<0.1	201	<0.1	201	<0.1	201
dibenzo[a,l]pyrene	<0.1	201	<0.1	201	<0.1	201	<0.1	201
dibenzo[a,e]pyrene	<0.11	201	<0.12	201	<0.1	201	<0.1	201
dibenzo[a,i]pyrene	<0.1	201	<0.1	201	<0.1	201	<0.1	201
dibenzo[a,h]pyrene	<0.1	201	<0.1	201	<0.1	201	<0.1	201
coronene	<0.1	201	<0.1	201	<0.1	201	<0.1	201
PAH 4 Sum Lower ug/kg	0.15		0.07		1.08		1.35	
PAH 4 Sum Upper ug/kg	0.39	258	0.29	341	1.17	57	1.35	60

OEC Sample No.	21548	22172	22409	21508				
FERA LIMS No.	S13-045666	S13-064361	S14-009864	S13-045452				
Description	Wholesome Banana Slices	Fruit and Fibre	Banana Chips	Banana Chips				
ug/kg whole weight		%U	%U	%U				
acenaphthylene	1.20	67	2.05	22	1.07	37	1.48	24
acenaphthene	<0.74	201	1.13	77	<0.42	201	<0.61	201
fluorene	1.15	139	4.82	28	0.66	117	0.83	158
phenanthrene	16.15	23	43.92	21	3.93	39	4.15	39
anthracene	3.15	21	4.16	21	0.67	26	0.66	23
fluoranthene	12.84	22	15.66i	22	3.36i	33	7.57	22
benzo[c]fluorene	1.02	21	1.16	21	0.21	44	0.51	21
pyrene	13.32	22	13.07i	24	4.69i	27	11.46	22
benzo[ghi]fluoranthene	1.97	16	0.83	25	0.74	19	1.28	17
benz (a) anthracene	1.89	17	0.28	39	0.42	41	0.48	18
benzo[b]naphtho[2,1-d]thiophene	<0.05	201	<0.03	201	<0.06	201	<0.03	201
cyclopenta[c,d]pyrene	0.51	16	0.26	18	0.33	17	0.45	16
chrysene	2.45	17	0.48	26	0.53	28	0.63	20
5-methylchrysene	<0.06	201	0.01	201	<0.01	201	0.02	101
benzo[b]fluoranthene	0.57	22	0.12	85	0.15	69	0.25	66
benzo[jj]fluoranthene	0.32	21	0.05	43	<0.06	201	0.10	26
benzo[k]fluoranthene	0.21	25	<0.06	201	<0.07	201	<0.09	201
benzo[e]pyrene	0.61	24	0.12	53	0.16	65	0.31	18
benzo[a]pyrene	0.40	43	0.10	121	0.13	94	0.25	66
indeno[1,2,3-cd]pyrene	0.19	75	<0.11	201	<0.12	201	0.22	57
dibenz[ah]anthracene	<0.07	201	<0.04	201	<0.05	201	<0.07	201
benzo-[g,h,i]perylene	0.25	36	0.12	101	0.15	69	0.31	20
anthanthrene	<0.1	201	<0.1	201	<0.1	201	<0.1	201
dibenzo[a,l]pyrene	<0.1	201	<0.1	201	<0.1	201	<0.1	201
dibenzo[a,e]pyrene	<0.12	201	<0.1	201	<0.1	201	<0.11	201
dibenzo[a,i]pyrene	<0.1	201	<0.1	201	<0.1	201	<0.1	201
dibenzo[a,h]pyrene	<0.1	201	<0.1	201	<0.1	201	<0.1	201
coronene	<0.1	201	<0.1	201	<0.1	201	<0.1	201
PAH 4 Sum Lower ug/kg	5.31		0.98		1.23		1.61	
PAH 4 Sum Upper ug/kg	5.31	9	0.98	57	1.23	44	1.61	32

OEC Sample No.	21511	21646	21649	21957				
FERA LIMS No.	S13-045455	S13-048021	S13-048817	S13-049298	Milk			
Description	Plantain Chips Savoury	Banana Chips 100% Sun Dried	Chocolate Covered Banana Chips	Banana Chips				
ug/kg whole weight	%U	%U	%U	%U	%U			
acenaphthylene	<0.16	201	1.56	26	1.79	25	13.99	21
acenaphthene	<0.63	201	0.48	151	2.61	35	2.01	42
fluorene	<0.67	201	1.60	52	4.72	26	12.31	22
phenanthrene	1.11	130	4.74	30	37.52	21	74.94	21
anthracene	0.07	88	5.57	21	7.04	21	16.32	21
fluoranthene	2.28	34	3.92	26	23.42	21	35.00	21
benzo[c]fluorene	<0.03	201	0.68	21	1.25	21	1.17	21
pyrene	3.21	33	5.97	23	20.56	21	26.93	21
benzo[ghi]fluoranthene	0.44	24	1.11	16	2.43	16	2.68	16
benz (a) anthracene	0.06	69	0.73	19	3.27	16	2.61	16
benzo[b]naphtho[2,1-d]thiophene	0.03	69	<0.03	201	0.11	40	0.23	24
cyclopenta[c,d]pyrene	0.13	22	0.33	17	1.03	16	1.46	16
chrysene	0.11	74	0.82	23	4.13	16	3.19	16
5-methylchrysene	<0.01	201	<0.01	201	<0.03	201	<0.01	201
benzo[b]fluoranthene	0.26	71	0.18	101	0.79	28	0.53	38
benzo[jj]fluoranthene	0.08	30	0.10	26	0.53	17	0.38	18
benzo[k]fluoranthene	<0.09	201	0.07	116	0.22	40	0.19	45
benzo[e]pyrene	0.41	18	0.20	34	0.74	19	0.53	20
benzo[a]pyrene	0.28	60	0.17	142	0.53	48	0.38	65
indeno[1,2,3-cd]pyrene	0.31	42	0.15	56	0.25	36	0.10	82
dibenz[ah]anthracene	<0.07	201	<0.05	201	<0.05	201	<0.05	201
benzo-[g,h,i]perylene	0.50	18	0.17	28	0.28	21	0.12	37
anthanthrene	<0.1	201	<0.1	201	<0.1	201	<0.1	201
dibenzo[a,l]pyrene	<0.1	201	<0.1	201	<0.1	201	<0.1	201
dibenzo[a,e]pyrene	<0.11	201	<0.1	201	<0.1	201	<0.1	201
dibenzo[a,i]pyrene	<0.1	201	<0.1	201	<0.1	201	<0.1	201
dibenzo[a,h]pyrene	<0.1	201	<0.1	201	<0.1	201	<0.1	201
coronene	0.23	88	<0.1	201	<0.1	201	<0.1	201
PAH 4 Sum Lower ug/kg	0.71		1.90		8.72		6.71	
PAH 4 Sum Upper ug/kg	0.71	80	1.90	41	8.72	7	6.71	9

OEC Sample No.	21958	21959	
FERA LIMS No.	S13-049299	S13-049300	
Description	Milk Chocolate Banana Chips	Coated Banana Chips	
ug/kg whole weight		%U	%U
acenaphthylene	0.82	36	0.56
acenaphthene	1.20	64	1.00
fluorene	3.40	31	3.10
phenanthrene	34.39	21	13.19
anthracene	7.33	21	2.71
fluoranthene	20.99	21	8.28
benzo[c]fluorene	1.24	21	0.54
pyrene	17.74	21	6.91
benzo[ghi]fluoranthene	2.21	16	0.87
benz (a) anthracene	2.73	16	1.06
benzo[b]naphtho[2,1-d]thiophene	0.10	43	<0.03
cyclopenta[c,d]pyrene	1.17	16	0.57
chrysene	3.39	16	1.36
5-methylchrysene	<0.01	201	<0.01
benzo[b]fluoranthene	0.64	33	0.22
benzo[jj]fluoranthene	0.44	18	0.15
benzo[k]fluoranthene	0.23	39	0.08
benzo[e]pyrene	0.60	20	0.26
benzo[a]pyrene	0.47	54	0.17
indeno[1,2,3-cd]pyrene	0.21	41	0.09
dibenz[ah]anthracene	<0.05	201	<0.05
benzo-[g,h,i]perylene	0.26	22	0.13
anthanthrene	<0.1	201	<0.1
dibenzo[a,l]pyrene	<0.1	201	<0.1
dibenzo[a,e]pyrene	<0.1	201	<0.1
dibenzo[a,i]pyrene	<0.1	201	<0.1
dibenzo[a,h]pyrene	<0.1	201	<0.1
coronene	<0.1	201	<0.1
PAH 4 Sum Lower ug/kg	7.23		2.81
PAH 4 Sum Upper ug/kg	7.23	8	2.81
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Table 3. Quality Control Procedures

In order to demonstrate that adequate confidence can be placed in the results obtained, the following requirements were observed.

Each batch of samples analysed included a full reagent blank, the contribution from which was found to be negligible. For further confidence each batch of samples analysed included a reference material (T0651 Palm Oil), for which results were compared with a criteria range derived from the assigned consensus data from multiple laboratory testing. Results for the batch RM fall within the acceptable range.

Quality Control Results

Compound	T0651 Palm Oil Reference Material Acceptance Criteria			Batch RM				
	Assigned Value (ug/kg) From Consensus Data	Target Standard deviation σ ug/kg	Acceptable Range ug/kg	9988	9991	10154	10129	10201
benz (a) anthracene	2.34	0.515	1.83-2.86	2.04	2.12	2.17	2.15	2.19
benzo[b]fluoranthene	1.97	0.434	1.54-2.40	1.82	1.65	1.58	1.66	1.69
benzo[a]pyrene	1.58	0.347	1.23-1.93	1.55	1.40	1.50	1.54	1.48
indeno[1,2,3-cd]pyrene	1.56	0.344	1.22-1.90	1.48	1.37	1.41	1.44	1.45
benzo-[g,h,i]perylene	1.57	0.345	1.23-1.92	1.46	1.28	1.30	1.34	1.39
chrysene	2.86	0.630	2.23-3.49	2.34	2.64	2.45	2.7	2.64
PAH4 (sum)	8.50	1.870	6.63-10.37	7.75	7.81	7.70	8.05	8.00

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